

Electrical Contracting

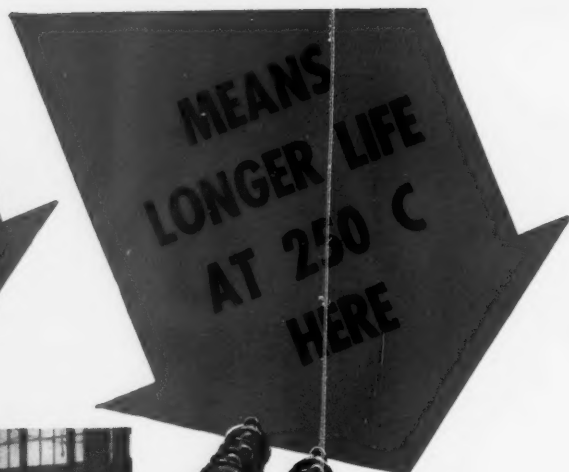
THE MAGAZINE OF ELECTRICAL CONSTRUCTION AND MAINTENANCE



MARCH 1943

Wiring, motors and control should be selected to fit the whole production layout. See Paper Mill Power and Control, Page 27 and "Electric Oil Field Drives," Page 34.

INDUSTRIAL ELECTRIFICATION SECTION
Pages 57-68



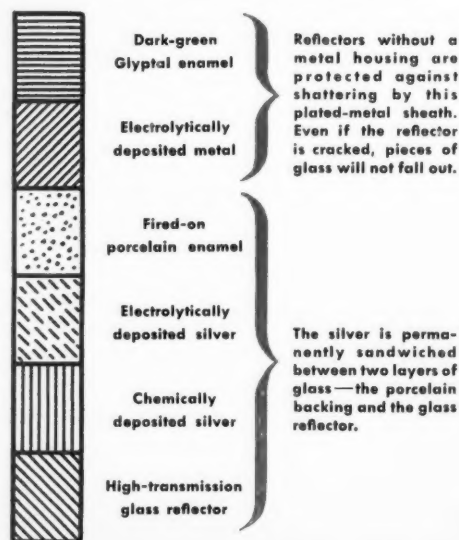
SEE THE NEW WAYS THAT LONGER LIFE IS BUILT RIGHT INTO G-E SILVERED-GLASS FLOODLIGHTS

That's Why These Are the Best Glass Floodlights G. E. Has Ever Built

Particularly useful for protective lighting, this new line of silvered-glass floodlights—Types L-43, L-49, and L-68—produce a “big floodlight” effect, because silvered-glass reflectors are from 10 to 30 per cent more efficient than metal reflectors.

The initial high temperature used in fusing the porcelain enamel backing to the silvered-glass surface builds up an immunity against deterioration from subsequent operating temperatures—temperatures often as high as 250 C with 1500-watt lamps. What's more, the high annealing temperature automatically eliminates any weak reflectors which might otherwise crack and break early in service.

If you wish more detailed information, or if you have a special outdoor lighting problem, don't hesitate to call or write the nearest G-E office. We want you to get the longer life that's built into every G-E silvered-glass floodlight. *General Electric, Schenectady, N. Y.*



An enlarged cross section of a G-E silvered-glass reflector

GENERAL ELECTRIC

SOLDERLESS CONNECTORS THAT HOLD LIKE A VISE!

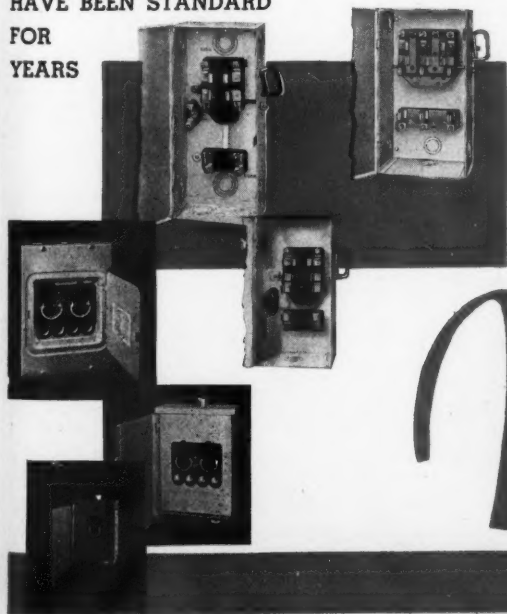
1/2" socket
wrench for
3 larger
sizes

Enormous pres-
sure makes
electrical con-
tact absolute

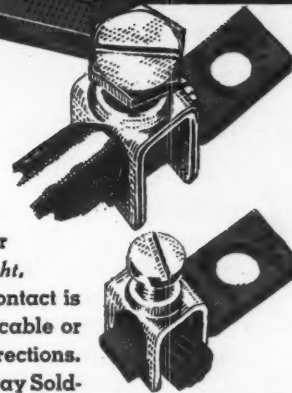
Cable or wire
can be in-
serted from any
of 3 directions

FROM YOUR JOBBER — HE HAS THEM
IN CONVENIENT, ECONOMY PACKAGES!

SOME FAMED MURRAY SWITCHES IN
WHICH MURRAY SOLDERLESS CONNECTORS
HAVE BEEN STANDARD
FOR
YEARS



So strong that they'll take
all the tightening you will ever
give them. When they're tight,
they HOLD—and electrical contact is
absolute. You can insert the cable or
wire from any of three directions.
These speedily-installed Murray Sold-
erless Connectors have been stand-
ard in Murray Switches for years.
Metropolitan Device Corporation,
Brooklyn, N. Y.



SOLDERLESS CONNECTORS

by

Murray

Name _____

Address _____

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FOR CORROSIVE LOCATIONS These oil-immersed combinations are made in two forms—for both corrosive and hazardous locations—and are available through NEMA size 5.

NEW HIGH-VOLTAGE COMBINATION This recently developed combination starter provides split-cycle short-circuit protection and starting means for 2300- and 4000-volt motors.

DUST-TIGHT COMBINATIONS Available through NEMA size 5—these starters are for application in dusty locations—such as cement mills.



GENERAL  ELECTRIC

HEY BILL!

**YOU'RE DOUBLING YOUR
WORK WHEN YOU INSTALL
CONTROL THAT WAY!
EVER HEAR OF
G-E COMBINATION
MOTOR STARTERS?**

BY using G-E combination starters, you can cut the time required to install motor control by 50 per cent. That's because "combinations" combine two controls—a motor-circuit switch (with short-circuit protection) and a magnetic starter—in one, compact, easy-to-mount unit.

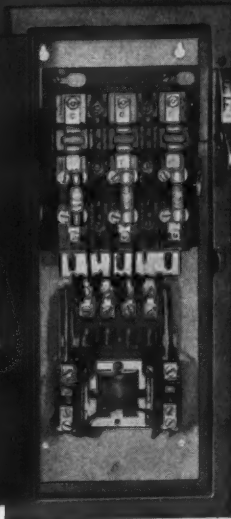
But that isn't all—combination starters save critical material by eliminating unnecessary conduit; they offer your operators better protection because the case door is interlocked with the safety switch; and help you save valuable plant space by putting all necessary motor control in one case.

The next time you order motor control, save man-hours and critical material by specifying General Electric combination starters. They are available for motors from 1 to 1000 horsepower. *General Electric Co., Schenectady, New York.*

WATERTIGHT COMBINATIONS
For outdoor application and for installation in damp locations—these starters are available through NEMA size 5.

FOR HAZARDOUS LOCATIONS
Enclosed in a high-strength, alloy case, these starters are ideal for Class 1, Group D, locations. They are available through NEMA size 4.

FOR GENERAL-PURPOSE USE Available up to and including NEMA size 5—these combinations are for indoor applications where atmospheric conditions are normal.



COMBINATION STARTERS FOR MOTORS FROM 1 TO 1000 HP

FLEUR-O-LIER'S Pledge:

"...THE SAME DEPENDABLE LIGHTING SERVICE
WITH LESS CRITICAL MATERIALS..."



The latest WPB limitation orders governing critical metals have required all fixture manufacturers to further reduce steel and other metals used in making fluorescent lighting fixtures.

Consequently, it is more important than ever that war plants needing fluorescent fixtures should specify those wearing this label. For FLEUR-O-LIER fixtures will continue to be *tested, certified* and *guaranteed* as meeting the same rigid MAZDA lamp makers' specifications for maximum light output and reliable, balanced operation.



When you see the FLEUR-O-LIER label you know they're dependable.

Constant research and development have made it possible for FLEUR-O-LIER Manufacturers not only to conserve critical materials but also to continue meeting the demand for dependable war production lighting.

FLEUR-O-LIERS embodying all these developments will be available to war plants on suitable priorities.



NEW! The FLEUR-O-LIER specifications, written by lighting experts, are now in booklet form, together with the story of the FLEUR-O-LIER program and list of manufacturers. Write for your copy today. It will make a valuable addition to your lighting information. FLEUR-O-LIER MANUFACTURERS, 2122-3 Keith Building, Cleveland, Ohio.

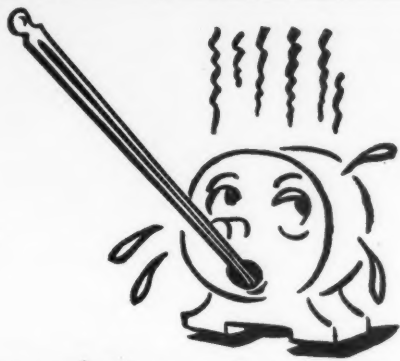
FLEUR-O-LIERS

CERTIFIED FIXTURES FOR FLUORESCENT LIGHTING

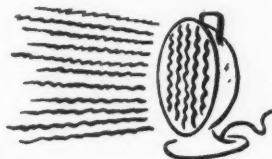
Participation in the FLEUR-O-LIER MANUFACTURERS' program is open to any manufacturer who complies with FLEUR-O-LIER requirements

Motors Run a Fever?

No wonder if they do more often today. They're working 3 and 4 times as many hours a year as in peace!



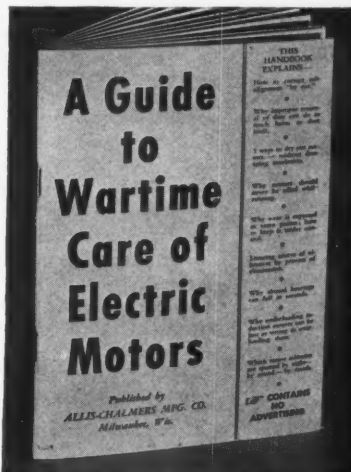
When a motor runs hot in your plant, do your men have explicit directions for locating the cause? If not, send in for your free copy of "Guide to Wartime Care of Electric Motors". Its QUICK DIAGNOSIS OF MOTOR AILMENTS is invaluable!



Friction makes heat — and so does electrical resistance. Pages 8 and 9 of Allis-Chalmers' new book tell how wartime preventive maintenance should fight friction . . . pages 16 and 17 outline strategy for preventing overload. Recommendations are simple, practical, geared to wartime — ideal for training.



Insulation is "fried" by excessive heat — bearings burned out — soldered connections melted. Play safe . . . put Allis-Chalmers' new motor maintenance guide to work protecting your motors!



Contents of this valuable new publication include the 9 main enemies of electric motors and how to fight them . . . dust, stray oil, moisture, friction, misalignment, vibration, uneven wear, overload and underload. Send in today for your free copy to ALLIS-CHALMERS, MILWAUKEE, WIS.

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ALLIS-CHALMERS

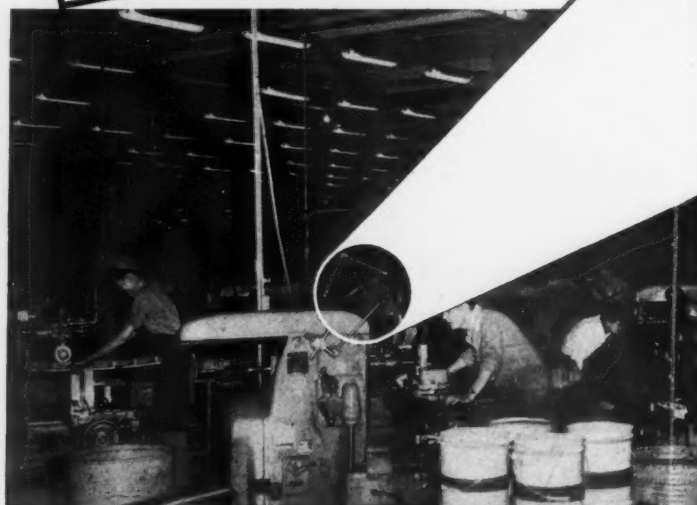


Electrical Contracting, March 1943

"Balanced" Lighting A MORE EFFICIENT TOOL for Every Close-Seeing Task



LIGHTING FOR SEEING
Close-seeing tasks require from 100 to 300 footcandles and more of illumination for accuracy and safety. Only localized lighting can provide these intensities efficiently and economically.



Light for Seeing is the workman's most vital tool. As such, it is all-important that any lighting installation be based primarily on the seeing needs of individual work operations.

General surplus lighting of workrooms in order to provide better illumination of individual work areas is both impractical and uneconomical. But, with "balanced" lighting, illumination can be fitted and efficiently proportioned in the quality, quantity and distribution required for each close-seeing task. Localized Lighting provides the relatively high intensities necessary for adequate close-up illumination directly on the work area. Balanced with General Lighting to illuminate background and overall areas, every lighting need is served more efficiently and economically.

Give your plant, your workers, your Country the advantages of this better production tool. Write, today, for a Fostoria "balanced" lighting analysis and recommendation without obligation.

THE FOSTORIA PRESSED STEEL CORPORATION • Fostoria, Ohio
In Canada—write Amalgamated Electric Corp., Ltd., Toronto

Saves
CRITICAL MATERIAL



Saves
POWER



Saves
WORKERS' EYES



Saves
TIME



Saves
INVESTMENT



For Study and Counsel on Your Lighting Problems

Fostoria Industrial Service Centers, located strategically in principal cities throughout the United States and Canada, are properly equipped and well qualified to solve your lighting problem. This service determines, first, what each worker's seeing requirements are on the job so he may work faster, accurately, safely, with a minimum loss of efficiency. It carries on to analyze specifically the kind, quantity and distribution of lighting which will properly provide the worker's seeing needs. It then selects and positions the lighting equipment to meet these specifications and stands ready at all times to maintain this equipment at top efficiency.



Lighting New Skyways for the Americas



WITH remarkable speed the Pan American Airways is completing numerous new airports in Mexico, Central and South America and the West Indies. The forging of this vital chain of airways will have an important part in the conduct of the war. It will assist in smashing Axis strategy.

In the construction of these airports several million feet of cable were used for power, communication, boundary, runway, beacon, landing, flood and search lights. A substantial portion of this cable is HAZASHEATH, a tough, long-lived rubber compound, closely resembling a solid truck tire in its strength and wear-resisting features, and serves both as an insulation and protective covering. It resists moisture, chemicals, heat and rough handling. It eliminates the necessity for lead or other metal coverings and their common troubles such as induced sheath losses, electrolysis, corrosion, crystallization and the lack of flexibility. The rugged HAZASHEATH non-metallic sheath eliminates complicated fibrous coverings, or metal tapes which make splicing a tedious, time-consuming job, requiring

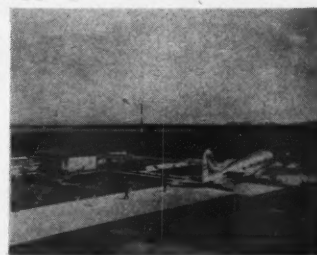
expert workmanship.

HAZASHEATH, because of its high rubber content sheath, is not now available. After the war it will again be available and improved in many ways. In the meantime, and for projects associated with the prosecution of the war, we can supply other Hazard cables, protected with less critical materials, that for years have given meritorious service for airport and street lighting. Ask us for particulars.

The completion of these airports will add another chapter to aviation's history and the important part it is playing in this global war. And later these same airports will become stepping stones that form the post-war highways to commerce and communication between the good neighbors of the Americas.



Photographs courtesy Pan American Airways



HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE COMPANY

Wilkes-Barre, Pennsylvania

Offices in Principal Cities



HAZARD



Electrical Wires and Cables

3217

Salvage Your Scrap — Buy U. S. War Bonds

EEING
from 100
ore of il-
nd safety.
n provide
and eco-



**Maintain the plants
behind the guns**



**with dependable ARROW
SWITCHES**



Maintain plant facilities in *ACTION* — *without interruption* of light or power. Every machine and lighting unit energized through dependable Controls, —ARROW Controls. For these are vital *PRODUCTION* controls that regulate the amount of work your machines and operators can do.

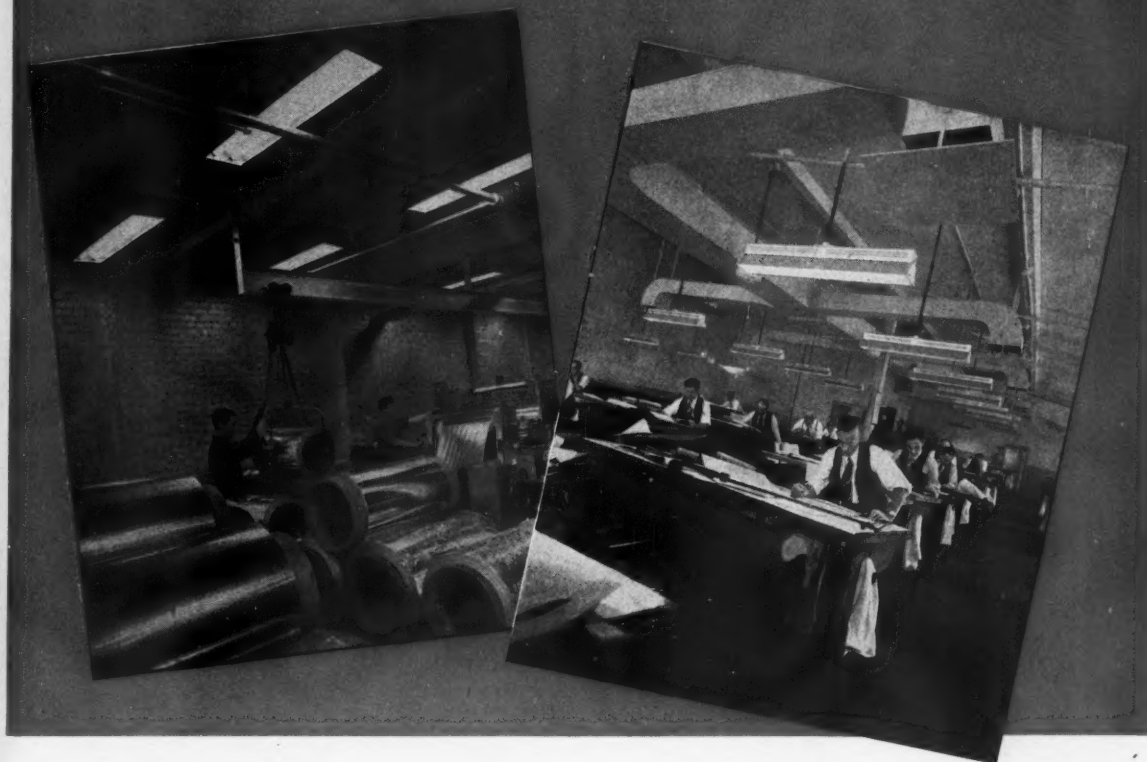
"Hot wires", heavy loads, round-the-clock operating schedules, — these demand super-stamina in Switches. . . Even minor shut-downs cause shortages at the front.

So install or replace with ARROW Switches for continuous, positive *ACTION* on your production-lines. . . Heavy-duty controls for lighting and power circuits; specification-grade T-rated 10, 20 and 30 Amp. "Type C" Switches, Rotary Snap Switches, Ceiling Pull Switches, Door Switches, Flush Tumbler Switches with or without outlet box covers. You'll find in them the fighting Quality to keep functioning, — the sure-fire *DEPENDABILITY* for war production.

ARROW ELECTRIC DIVISION
ARROW-HART & HEGEMAN ELECTRIC COMPANY, HARTFORD, CONN.

Electrical Contracting, March 1943

Don't let grime dim their "Daylight" Brightness



Remember how your workers responded when you put plenty of light in the right places? Those Alzak* aluminum reflectors you installed certainly made a great improvement. Better lighting resulted in more and better products.

Make certain you are retaining those advantages by giving your Alzak reflectors the attention they deserve. Their Alumilite† finish is hard and smooth, so these reflectors can be cleaned thoroughly without scratching. You can assure yourself of continued high efficiency and long life for your lighting system.

Dusting may be all your Alzak aluminum

*Registered trade mark. †Process Patented.

reflectors need to keep them bright and shining. *Washing* with a mild soap and water may be necessary, if they've gathered grime from dirt and fumes in the air. They may even need a different treatment when they're working where conditions are severe.

How to restore Alzak aluminum reflectors to their original high reflectivity is told in the booklet, "Instructions for the Protection and Maintenance of Alumilite Finishes and Alzak Reflectors." For a copy, write ALUMINUM COMPANY OF AMERICA, 1946 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM

Electrical Contracting, March 1943

THE COMPLETE LINE OF WAGNER MOTORS, TRANSFORMERS and BRIDGE BRAKES WILL HELP YOU KEEP WAR PRODUCTION ON TIME!

It takes plenty of dependable motors, transformers, and bridge brakes operating at top efficiency to maintain the high-speed production so necessary in our "all-out" war effort.

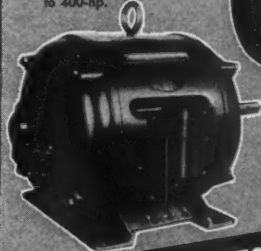
Wagner fully realizes this, and is working day and night turning out these items, supplying them wherever they are needed to help win this war.

If you need motors, transformers or hydraulic bridge brakes, consult Wagner.

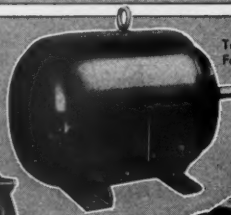
MOTORS

Wagner motors are built in a wide range of types and sizes with electrical and mechanical characteristics to fit the requirements of all types of motor-driven machinery and equipment. Bulletins MU-176, MU-182 and MU-183 illustrate and describe the complete line of Wagner motors. Everyone responsible for the purchase and maintenance of motors should have these bulletins.

Polyphase Squirrel-Cage Motors — 1/6 to 400-hp.



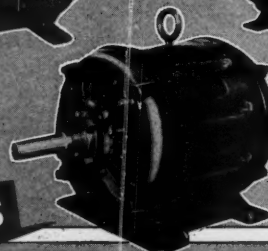
Totally Enclosed Fan-Cooled Motors — 1-1/2 to 125-hp.



Explosion-Proof Motors — 3/4 to 125-hp.



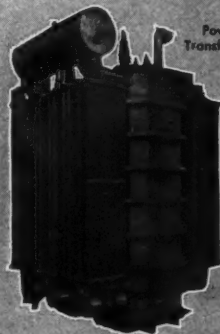
Multi-Speed Motors — 1/2 to 125-hp.



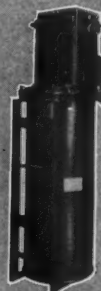
TRANSFORMERS

No matter what the requirement may be, Wagner can furnish the right transformer for the job. The line includes power transformers, distribution transformers, Nollamol transformers and constant-current regulators. Bulletins TU-180 and TU-181 give complete information on the line of Wagner transformers. These bulletins contain information of value to every transformer user.

Power Transformer



Constant-Current Regulator



Nollamol Transformer, (Non-Inflammable Liquid-Filled).



Distribution Transformer



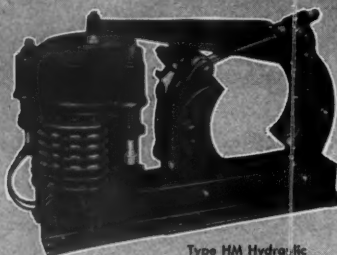
BRIDGE BRAKES

FIELD ENGINEERING SERVICE!

• 25 sales and service branches are located throughout the country. Trained field engineers are always ready to assist you in selecting motors, transformers, or hydraulic bridge brakes, to meet your particular requirements.



Type H Hydraulic Bridge Brakes



Type HM Hydraulic Bridge Brakes

Today, Wagner hydraulic bridge brakes are standard equipment on most overhead cranes. They are ideal for new installations as well as conversions from mechanical brakes. Available in type H for inside cranes, and type HM for outside cranes where automatic parking attachment is desirable. You should have bulletin IU-20. It will be sent on request.

Wagner Electric Corporation

6400 Plymouth Avenue, Saint Louis, Mo. U.S.A.

MOTORS • TRANSFORMERS • FANS • BRAKES



X-Ray

SILVER MIRROR GLASS

CURTIS LIGHTING, INC.

6135 W. 65TH STREET • CHICAGO



Nearly 40 per cent of industry's younger workers have eye defects! The eyes of all employees suffer strain and fatigue under inadequate illumination. Read how MILLER LIGHTING can help you eliminate plant accidents, layoffs and lost time . . .

Under today's terrific pressure men with perfect vision work fast and accurately only with adequate il-

lumination. But remember...a high percentage of industry's workers do *not* have perfect vision! They can do all expected of them...*all they want to do*...without accidents or slow-downs, only if you help them see clearly and sharply at all times.

MILLER 50 FOOT CANDLER or 100 FOOT CANDLER, the *original* continuous wireway fluorescent lighting systems, can provide war-manpower with adequate man-made

daylight for better, faster, safer production. Or, MILLER can provide modern incandescent or mercury lighting, depending on the individual plant's set-up and particular problems.

Because of this the MILLER field engineer is in an unbiased position to work with you right now . . . to cooperate intelligently in the fine work you are now doing to help American industry speed Victory.

THE MILLER COMPANY • MERIDEN, CONNECTICUT

ILLUMINATING DIVISION
Fluorescent, Incandescent,
Mercury Lighting Equipment

• OIL GOODS DIVISION
Domestic Oil Burners
and Liquid Fuel Devices

• ROLLING MILL DIVISION
Brass and Phosphor Bronze
in Sheets, Strips and Rolls

WAR CONTRACTS DIVISION
War Material

MILLER

Since 1844



Oil-drenched and salt-encrusted, PYRANOL TRANSFORMERS COME THROUGH UNHARMED

Three Pyranol transformers were in operation on a large tanker when it was torpedoed off the Atlantic coast. For days they lay submerged in oil and salt water, until what was left of the tanker was salvaged. When the ship finally reached dry dock, the transformers were tested and found to be in as good working condition as the day they were installed.*

IT'S HARD to find an application where Pyranol transformers won't fill the bill. The high dielectric strength which they have in common with other liquid-filled transformers makes it easy for them to withstand the effects of lightning and of voltage surges from switching operations.

Install Pyranol Transformers Right Where You Need Them

Location doesn't matter; you can install Pyranol transformers underground, on an overhead platform, on the roof, on the factory floor, indoors or outdoors—or install them indoors this year and move them outdoors next year if your needs change. The pressure-tight tank protects vital parts from

the effects of dust, dirt, and atmospheric moisture—as well as from oil and salt water.

Maintenance Cost Is Low

Pyranol, the synthetic, noninflammable liquid with which these transformers are filled, is nonsludging—maintenance is negligible. Tests made recently show that the Pyranol in the first transformers of this type, installed more than ten years ago, is still in its original condition.

For further information about Pyranol transformers, call your G-E representative today. He'll be glad to help you. *General Electric Company, Schenectady, New York.*

*Reg. U.S. Pat. Off.

GENERAL ELECTRIC



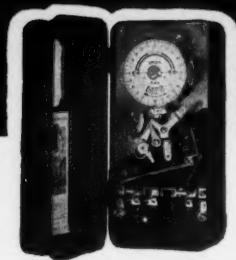
SECURE

DEPENDABLE AND CONVENIENT OPERATION OF
PROTECTIVE FLOODLIGHTING WITH
automatic control



SANGAMO TIME-SWITCHES

Industrial plants engaged in war production need the protection of floodlighting for vital property. Factory yards, railroad sidings, building approaches, substations, transformer banks — all are considered vital property. Sangamo Time-Switches secure greater operating dependability and convenience for floodlighting systems. Contrary to human traits, a Sangamo Time-Switch does not forget to turn lights on or off at the proper time . . . all operations are fully automatic — therefore dependable. Install the time-switch described on this page for protective floodlighting systems.



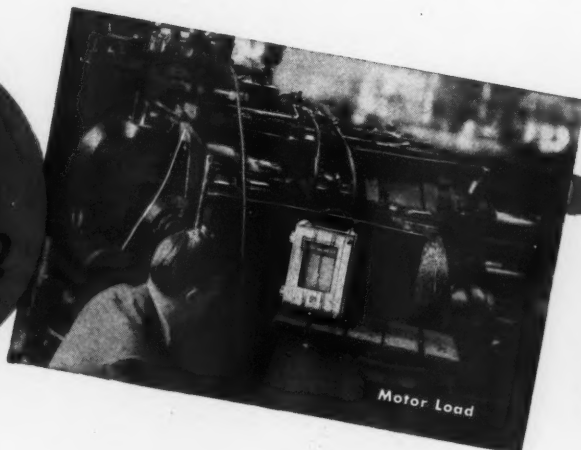
DURING BLACKOUTS

DURING any current interruption, as for instance when a master-switch is pulled for a temporary black-out, Form VSWZ Astronomic Dial Time-Switch will continue to run for ten hours. An automatic carry-over feature provides for clock-spring operation when the current is off. The clock-spring rewinds automatically when the current is restored, and the time-switch resumes its normal synchronous operation.

SANGAMO ELECTRIC COMPANY **SPRINGFIELD ILLINOIS**

The RIGHT Instruments Help Get the Jump on TROUBLE

How Would You Handle these 3 Jobs?



Motor Load



Feeder Circuits

- 1 **MOTOR LOAD** is being analyzed with a G-E portable inkless recorder. The test is made *without interrupting production*, simply by using a split-core current transformer (clamped around a lead in the control cabinet) connected to the recording ammeter.
- 2 **FEEDER CIRCUITS** are being checked with the G-E hook-on volt-ammeter. Both current and voltage are measured with just *one* instrument, simply by flicking the selector switch, first to AMPS and then to VOLTS.
- 3 **MOTOR-STARTING CURRENT** is being determined quickly by means of a G-E pointer-stop ammeter. An oscillograph could be used, but it is easier to use this instrument—particularly when there are a large number of motors to be checked.

These are typical examples of using the RIGHT instrument to get electric-circuit information in a hurry, without interrupting production. Have you the RIGHT ones for your preventive maintenance? This is particularly important if you have green hands in your maintenance department.



Motor-starting Current

5 Instruments Will Do 90% of Most Testing Jobs

The G-E instruments shown below will handle most of your testing. Prices are for estimating only. For details, ask the nearest G-E office for the bulletins listed. If you need other instruments, let us know. *General Electric, Schenectady, N. Y.*

WHICH OF THESE TESTING INSTRUMENTS DO YOU LACK?



\$70

AK-1



\$26

AP-9



\$23

AS-5



\$70

CF



\$132

CD

A-C HOOK-ON VOLT-AMMETER. The handiest of instruments for quick load checks—no cutting conductors or interrupting service. Measures volts also. Bulletin GEA-2950.

MEDIUM-SIZE PORTABLE, A-C (AND DP-9, D-C). Accurate within $\frac{1}{2}$ of one per cent. Very portable—size only $2\frac{1}{2}$ by $4\frac{1}{2}$ by $6\frac{1}{2}$ inches. Price covers a 5-amp ammeter. Bulletin GEA-1784.

POCKET-SIZE PORTABLE, A-C (AND DS-5, D-C). Accurate within one per cent. Slips easily into a coat pocket—size 2 by $3\frac{1}{2}$ by $3\frac{1}{2}$ inches. Price covers a 5-amp ammeter. Bulletin GEA-1784.

INKLESS RECORDER, PORTABLE. An inexpensive instrument. Inkless—no pen to start and no ink to spill. Price covers a 5/10-amp ammeter. Bulletin GEA-3187.

INK RECORDER, PORTABLE AND SWITCHBOARD. Ideal for use where a high degree of accuracy is very important. Price covers a 5-amp portable ammeter. Bulletin GEA-1061.

GENERAL ELECTRIC



Decoration...for **INDIFFERENCE**

No medals . . . no wound stripes . . . no citations for the men on the industrial casualty lists!

They are maimed or killed . . . just as surely as if by snipers' bullets or enemy bombs . . . by carelessness, or ignorance, or indifference. And the appalling fact is that day after day these homefront casualties keep mounting . . . more, many times more than are reported from the fighting fronts.

For forty years, Youngstown has had an active Safety Program in all its plants. Today, facing increased hazards of war production on the one hand

and the need for maximum effective manpower on the other, we have redoubled our efforts to educate and protect our workers. We subscribe to and give our fullest support to the work of the National Safety Council.

As customer, prospect or friend, we urge that you, too, get behind this work. Enroll in the cause of the National Safety Council. Send a subscription to National Chairman Wm. A. Irwin, 71 Broadway, New York City, for the War Production Fund to Conserve Manpower. Do all you can to help America win this war on the home front.

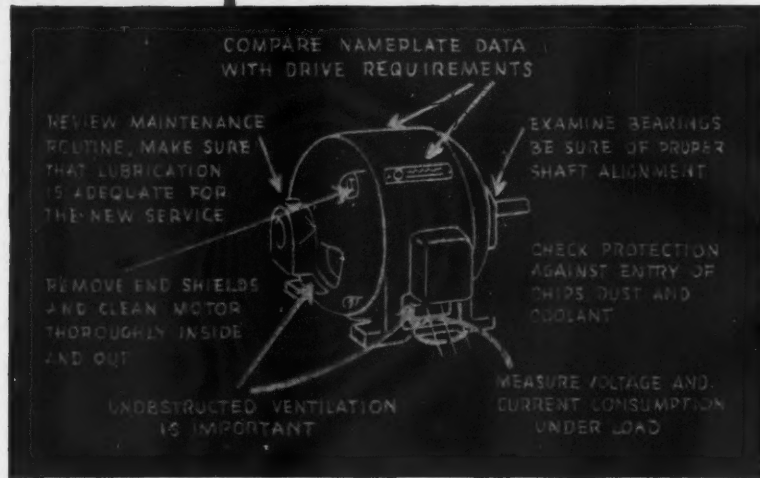


THE YOUNGSTOWN SHEET AND TUBE COMPANY
YOUNGSTOWN, OHIO



IT'S TIME
TO BE A
CRANK ABOUT

MOTOR CARE



protect your production with this maintenance plan

Planned motor maintenance, keyed to today's loads and conditions, saves vital hours by forestalling future breakdowns and delay. In replacing hit-or-miss motor service with a regular schedule of trouble-prevention, you'll find real help in the new G-E publication, "How to Care for Motors."

The check list (right) tells what to do. This book tells how to do it, using well-proved methods that save time and help assure long-lasting motor service.

And, of course, your local G-E Motor Representative is always ready to aid you in putting these suggestions into practice, or in getting the new motors you may need for essential wartime projects.

1. Make sure that motors are selected to *match the job*. Install motors so they are properly aligned with the driven load and are easily accessible for regular inspection.

See "How to Care for Motors"

2. Keep motors free from dust and dirt. Establish a definite cleaning schedule.

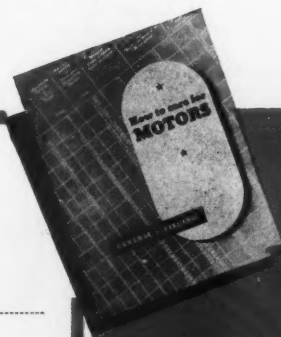
See "How to Care for Motors"

3. Be sure that lubrication is frequent enough to take care of increased production. See that employees are instructed as to proper methods.

See "How to Care for Motors"

4. A general overhauling of hard-worked motors will add years to their life. If your motors haven't had an overhaul in the last year, try to arrange your schedule to permit one.

See "How to Care for Motors"



General Electric, Sec. EC 750-179C
Schenectady, N. Y.

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Every supervisor and maintenance man will find this book of value. It tells what to do to get the most out of motors, old or new. If you're setting up a maintenance program to keep up with today's superintended demands, or if you're "reviving" motors from one job to another, or equipping machines with new motors, you'll find this booklet of helpful motor facts will save you time. Write for a copy.

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SPERO "INSTA-LITE"

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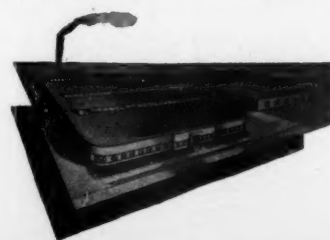
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7. LOW TEMPERATURE STARTING—INSTA-LITE starts and operates lamps at ambient substantially lower temperatures than conventional ballast.
8. SAFE UNIT TEMPERATURES—Starting and operating unit temperatures are well under maximum limits established by Underwriters' Laboratories.
9. LOW VOLTAGE STARTING—INSTA-LITE starts lamps at lower line voltages than required by conventional ballast. It operates lamps at their rated voltage. Momentary higher voltage for starting varies, depending on lamp resistance, from 420 to 450 volts, well under the 600 volts (specified by Underwriters' Laboratories as "low voltage").
10. FULL YEAR GUARANTEE—INSTA-LITE is warranted to be free from defects of material and workmanship for a year from installation date.

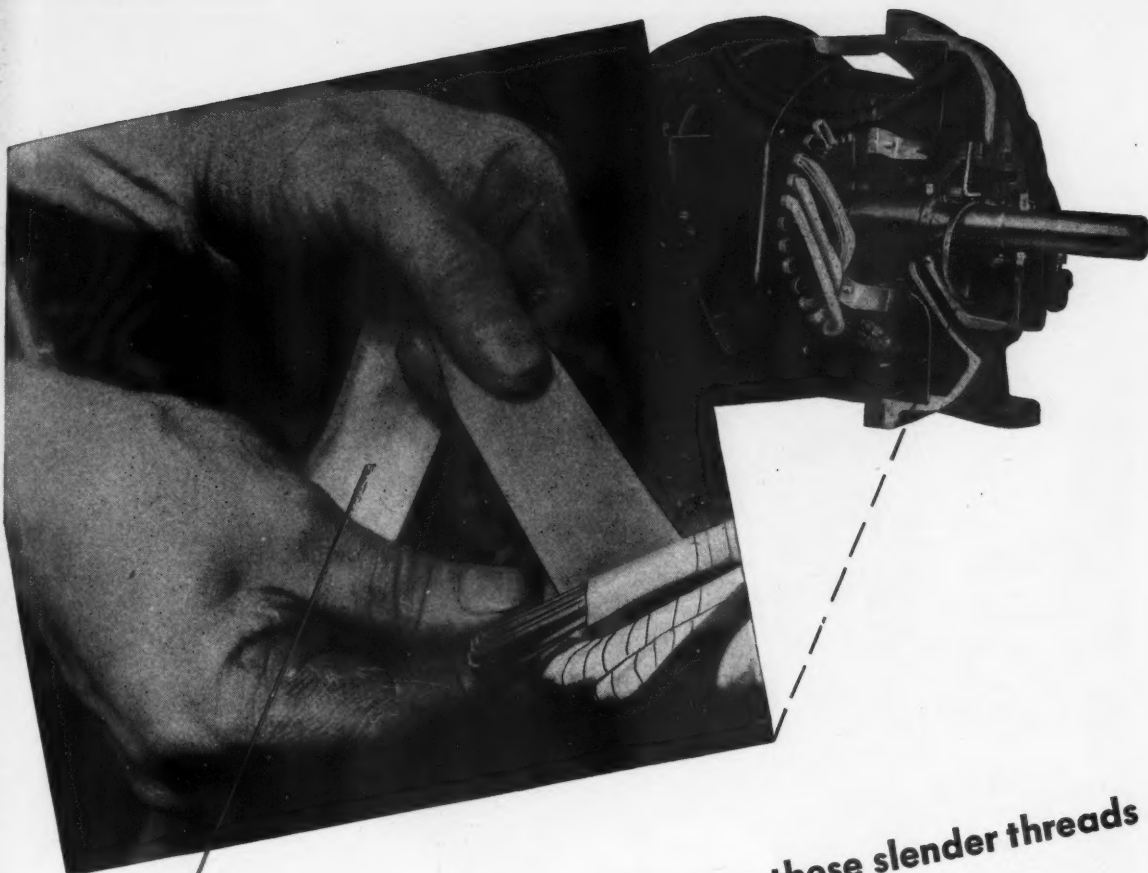
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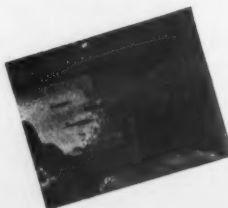


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CIRCUIT BREAKER

now combines the time-delay action of the time-tested and proven THERmal trip with the fast MAGnetic trip.



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3. Tri-metal thermal trip element for time-delay tripping
4. Magnetic trip—for short circuit instantaneous tripping
5. Handle Signal for single pole with automatic reset
6. Signal Button on double pole for trip indicator
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11. Heavier moulded sections, with air space between sections.
12. Interchangeable with original ⑦ Type AC Circuit Breaker

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When tripped, the handle on the single pole breaker automatically returns to the OFF position, thus indicating the current interruption . . . On the double pole breaker, a red signal button is protruded from the face of the breaker on which the trouble has occurred.

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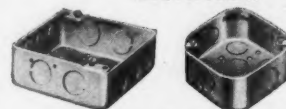
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A practical paper for electrical contractors,
 industrial electricians, inspectors, engineers
 and motor shops, covering engineering, in-
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 struction and maintenance.



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To

Signed

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CHECK UP!

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Anaconda's Preventive Maintenance Plan will help you check to see that cables in your plant are not being abused . . . to detect electrical weaknesses that can be corrected.

If you follow this free plan you not only help yourself, but more important, you help the war effort. This manual provides a practical automatic method for complete analysis of circuits and equipment...uncovers potential weaknesses . . . methods for correcting them . . . with charts to enable quick periodic check-ups.

42228

NOTE: Through this Preventive Maintenance Plan you may uncover the evidence necessary to obtain an "emergency repair priority." This is explained fully in the plan book.



"Tomorrow may be too late . . . do it today!"

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Please send copy of the Anaconda Preventive Maintenance Plan for safeguarding production.

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Textiles—in War as in Peace

World's oldest industry performs modern miracles

WITH ever quickening tempo the friendly hum of the spinning wheel has echoed down the centuries—symbol of a mighty industry.

Its hum is heard today above the din of war.

Capt. Rickenbacker heard it as the lives of his party depended upon a thickness of rubberized fabric.

The hard-pressed soldier on a far-off Pacific isle hears it when he sees fresh supplies and ammunition descending from the sky via friendly parachute.

Adolf Schickelgruber hears it when winter joins forces with the enemies of his ill-clad armies and hastens the day of his defeat.

Yes, man is dependent upon textiles from the cradle to the grave—in peace and in war.

In peace man demands comfort and beauty. In war he must have comfort and protection. The textile industry is coming up to these expectations.

It is developing hundreds of special fabrics for special purposes. It has created clothing for wear, miles high in the stratosphere, and fathoms deep under the sea, clothing to meet the daytime heat of the desert and the bitter cold of its nights, clothing for the tropics and the Arctic, the swamps and mountains—for every climate and every condition.

Modern scientific warfare has forced the development of textiles that were not even thought of a year or two ago: camouflage nets; strong, light, wind-resistant Nylon tentings for the Arctic; heavy Nylon rope for glider towing; parachutes and parachute shrouds; self-sealing gas tanks; panzer hangars; cartridge and powder bag cloths; helmet linings; gas masks; fuses; canvas tops; windshield fabrics and seat upholstery for jeeps, trucks and other motorized equipment; uniforms for all armed services and for nurses, WAACS, WAVES, SPARS and MCWRS. Then there are windbreakers, raincoats, ski-troop uniforms and other items too numerous to mention. The Star Spangled Banner itself is a textile.

The Quartermaster Corps alone has issued specifica-

tions for over 300 different fabrics! Add to this the requirements of the Navy, the Air Forces, the various Civilian Defenses, the Red Cross and Lend-Lease and the sum total of textiles required for military and allied uses is approximately 70% of the total produced before the war to meet civilian requirements!

How the textile industry has been able to meet this unprecedented war demand, superimposed upon the industrial and essential civilian needs, is an inspiring story.

First, it stepped up its production to an all-time high. *Textile World's* index of textile-mill activity records three successive records for 1940, 1941 and 1942, the period covering the defense program and the first year of the war. This index for 1942 stood at twice that of an assumed "normal" year. It is noteworthy that this was accomplished mainly with existing equipment.

Second, the textile industry did a job of plant-conversion which was a masterpiece of intra-industry cooperation and idea-sharing.

Third, its technicians developed new and superior fabrics and finishes. Its engineers and production men increased the speed and the efficiency of the entire production machine.

How well all this was done becomes evident when we consider the obstacles to be overcome. Imports of critical fibres have been cut off. There is a shortage of certain chemicals and dyes. There is a high rate of turn-over in manpower and a shortage in experienced labor. It is increasingly difficult to secure machines and repair-parts—just to mention a few of the major problems.

But the textile industry delivered. It has built up an adequate reserve for our rapidly expanding armed services. It is helping to supply the armies of our allies. It is providing for our civilian population... all without giving the war leaders a single moment of serious worry.

Major General Edmund B. Gregory, Quartermaster

This is the ninth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

General of the United States, in special statements prepared for *Textile World*, and in addresses before textile groups, has stated that the cooperation of the textile industry has been outstanding and that the industry has kept ahead of schedule on all the major types of fabrics required.

General Gregory recently pointed out that of the approximately 234,000,000 yards of combed twill produced in this country in 1942, the Army took about 87%, the Navy 10%, leaving 3% for non-military purposes.

Col. Robert T. Stevens, of the Quartermaster Corps, in a recent address, referred to the output of duck. Production of that vital military fabric was twice doubled in six months, between January and July 1942, he said, and an annual capacity of 600,000,000 yards of all types of duck was made available. "The current rate of production of cotton duck is five times normal," said Col. Stevens, "and 38% comes from converted carpet, plush and upholstery mills. Based upon known requirements, production in this field is fully adequate".

"Fully adequate" is high praise when it refers to duck production. At the outbreak of the war it looked as if there was no possible chance of meeting requirements, at least during the first year. Nor would there have been if other types of mills had not shifted to making this fabric, and if experienced duck manufacturers had not gone "all-out" in teaching the newcomers, potential post-war competitors, everything they knew about the manufacture of duck. American industry offers many such examples of unselfish cooperation.

Another outstanding accomplishment, made necessary by the interruption of burlap imports, was the conversion of looms producing peacetime fabrics to the production of bag fabrics. The tremendous demand for sandbags, camouflage cloth, food, agricultural and other bagging, caused a conversion order to be issued for the purpose of raising the annual production rate of osnaburg from 263,500,000 yards to 660,000,000 yards, and bag sheeting from a rate of 488,000,000 yards to 855,000,000 yards. The result of this order, and of the military schedules already in effect, was to put the cotton weaving industry about 88% into war, essential industrial, and essential civilian production.

Plant conversion went on with feverish speed. Carpet looms were swung to blankets and duck; the lace industry turned to mosquito netting and insect netting of which it produced millions of yards. The flat-knitting industry with its tricot machines also is engaged in the manufacture of mosquito netting. The sewing thread industry was converted to the production of combed yarns. What once was the silk industry is now doing a tremendous amount of war work. Those mills which had equipped themselves for throwing Nylon yarns for hosiery are now throwing the Nylon for parachutes. That section of the silk industry that was equipped for weaving rayon fabrics is producing fabrics of high-tenacity rayon for flare chutes, cargo chutes and delivery chutes. Many silk and rayon looms that for-

merly wove clothing materials are now weaving parachute fabrics.

Today practically all Nylon is used for military purposes and the bulk of high-tenacity rayon goes into military fabrics.

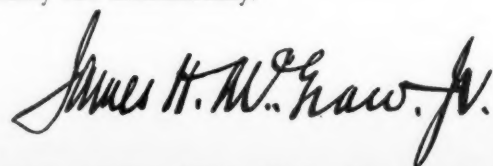
Above and beyond all the new developments is the gigantic job of producing millions of yards of standard fabrics of many colors and weaves. To produce all the uniform fabrics and blankets is in itself quite a job. The woolen and worsted industry has been doing it magnificently. Tent fabrics and summer fabrics produced by the cotton industry are no less a formidable assignment. I could point to myriad other jobs no less impressive.

The production man can indeed take pride in this record and behind the production man, the textile technician has been working tirelessly. Mildewproofing and waterproofing, so vital in a world at war, are in a new stage of effectiveness. A new process for waterproofing fabrics employs vinyl acetal plastic in place of precious rubber. Textiles that glow in the dark have been perfected for black-outs and other applications. American genius is solving problems many of which seemed insurmountable. Silk, for example, was something the Japanese thought we could never duplicate. A new synthetic textile filament that weighs but one eighth of the finest silk filament threatens to put the Japanese silkworm out of business after the war so far as we are concerned. The post-war possibilities of this development challenge the imagination.

Nor has the primary textile industry been alone in its contribution to the war. The textile machinery industry has been converted almost entirely to war work, save for a few facilities required to relieve extreme bottlenecks and supply essential maintenance and repair-parts.

Similarly, some textile mills, particularly hosiery mills hard hit by the silk and Nylon cut-off, are utilizing their space and skilled staffs to produce parts for war equipment.

The immediate significance of all this is its importance in the winning of the war. There is, however, a post-war implication which is important to the future of America. A mass production textile industry will serve civilians after the war more effectively than ever before, and will put new standards within the reach of millions. A long step has been taken toward that completely synthetic textile industry which some observers see in the future. The tempo of such changes has been accelerated tremendously. The oldest industry in the world, now one of America's largest, is showing a youth and vigor that promise much for the future... nationally and internationally.



President, McGraw-Hill Publishing Company, Inc.



W. T. STUART

Named Editor

A SUCCESSFUL business paper editor is made, not born. He makes himself.

He acquires theoretical and practical knowledge of his industry through years of study and experience. He learns to write and to speak with precision and, no less important, with imagination. He trains himself in finding out what his industry is thinking and doing and he skills himself in reporting what he sees and hears. Finally, he makes himself expert in the complicated job of planning and producing a magazine.

William T. Stuart, who, I am happy to announce, becomes editor of *Electrical Contracting* with this issue, has gone through that process of the self-making of an editor. He started as a stock boy with an electrical contractor in Rochester, New York, and worked his way into the shop, out on the job, into estimating, supervision and management. He educated himself and then educated others, conducting courses in estimating and labor analysis during the NRA days. Seventeen years of experience in electrical construction, the application and installation of industrial apparatus, and lighting system design was the material he had to work with when he started, under the tutelage of his famed predecessor, Earl Whitehorne, to make himself an editor. Beginning as Midwest editor in Chicago in 1937 he came to New York as managing editor in 1941 when Earl Whitehorne died.

I can offer no more accurate gage of the new editor's ability than the calibre of the editorial material run in this paper during the past year. All of these issues have been planned, executed, and in part written by Mr. Stuart. They have been tuned closely to the essential place that our industry occupies in the war effort. Article after article has told in practical fashion, how to apply, install, service and maintain vital electrical apparatus and material at full operating efficiency under war conditions. This policy will be continued as long as the war lasts.

This does not mean that the future is being ignored. The lessons of war will affect many of our traditional methods and they will need adequate study and interpretation. Entirely new materials are destined to double and triple the importance of electrical construction and maintenance in the industrial and social life of America.

The extensive electrification of the war effort is only a forerunner of what will come in peace-time. The future not only promises a fine market for quantities of new, modern electrical products—it plainly indicates, also, that the job of maintaining intricate industrial electrical systems will rank in importance with the maintenance of production machinery itself.

Mr. Stuart's intimate knowledge of industry practices and methods has given him a practical viewpoint—important in an editor. But over and above this, yet based upon it, Mr. Stuart has projected the probable shaping of this industry into the important phases of electrical construction and maintenance, so that the transition from war to peace may be thoroughly stabilized. His is an important task and he has demonstrated talents to carry *Electrical Contracting* onward in the tradition of service which has given it an enviable place in the field of industrial journalism.

Wm. K. Beards.
Publisher



They Handed Us—
the **BLUEPRINTS** and
a **REQUISITION PAD**

An Actual Example of the Time-Saving Gains of the Graybar MM Plan*

As the engineering department for an important war project became more and more overworked, it found it necessary to "pass the buck" to the purchasing staff. Blueprints were approved without drawing off a list of materials, and the purchasing department was told to "get us what the prints require".

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quickly reviewed by the buyer and the purchase order issued with virtually no change.

The electrical supplies reached the job on time. Record-keeping and billing were simplified by a single order to a "one-call" source.

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... on electrical supplies, **GRAYBAR** makes its procurement experience a part of your war production facilities. In less than one hour, your **GRAYBAR** Procurement Adviser can review the *four-point plan* which "dovetails" your electrical needs with the available production of more than 200 electrical manufacturers, distributed locally from more than 80 warehouses. Why not call your local **GRAYBAR** office about it today?

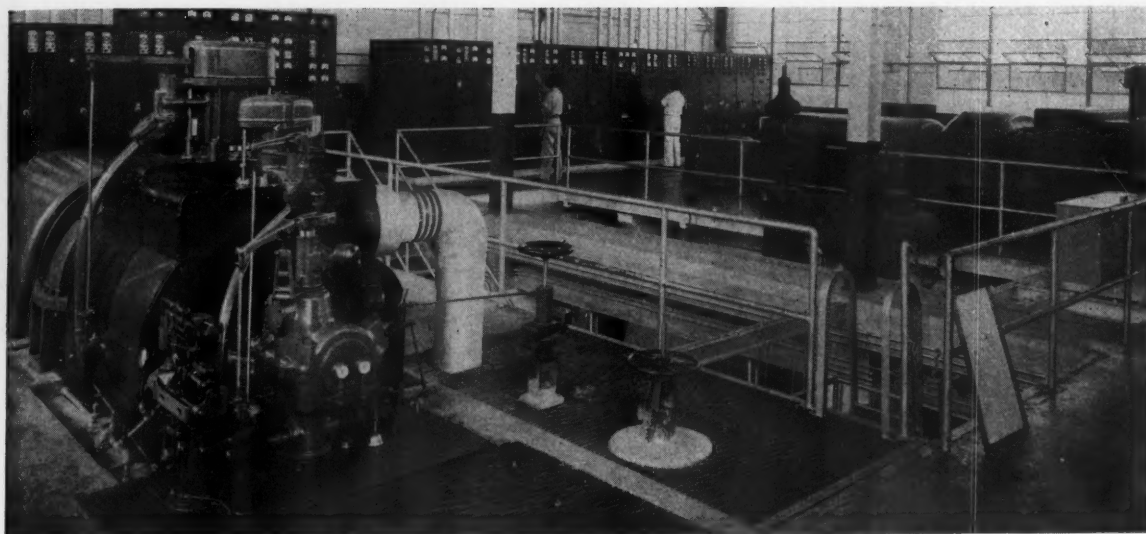
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IN OVER 80 PRINCIPAL CITIES



Paper Mill Power and Control



POWER HOUSE turbo-generator units and switchboard. 2000-kw. unit left foreground and 4000 kw. unit at right, both rated 0.8, 600 volts, automatic extraction condensing.

Modern electrification technique applied to a North Carolina paper mill illustrates important considerations in apparatus application.

ELECTRICAL work on this new plant of the Ecusta Paper Corporation at Pisgah Forest, N. C., was based on an initial installation of four paper machines and associated equipment. One year later experimental production was started. Shortly thereafter, the plant went into regular production. Regular production was hardly well under way when it was quite apparent that the demands for cigarette paper which is made there could not be fully supplied from domestic sources with existing capacity. An expansion program, involving four additional paper machines, was completed. All eight machines are now in regular production and are adequate to take care of a very substantial part of the cigarette paper requirements of the United States.

Electric power for the plant is partially generated and the remainder purchased from the local power company. Sufficient power is generated on the site by condensing automatic ex-

traction turbines to take care of processing steam requirements, thereby establishing a steam, power balance.

The generating equipment consists of two turbo-generating units one rated 2000 kw., 2500 kva., 0.8 power factor, and the other 4000 kw., 5000 kva., 0.8 power factor. Both units are of the automatic extraction condensing type, designed for operation at 400 lbs. gauge steam pressure at the throttle, 700 deg. F. total temperature, two inches absolute back pressure, and 75 lbs. gauge extraction.

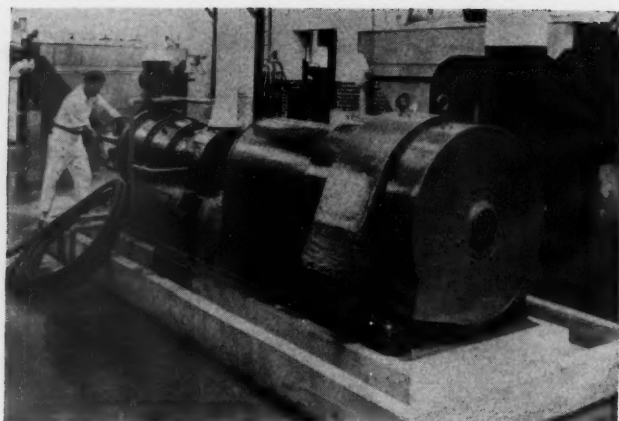
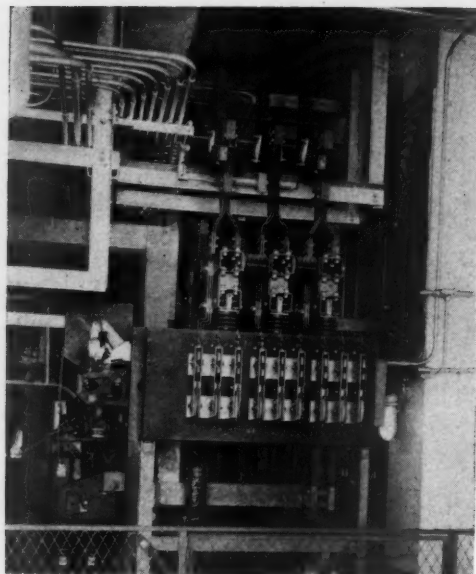
Power is generated and distributed at 600 volts, 3 phase, 60 cycle. Distribution to the various load centers is made through metal-enclosed switchgear equipped with drawout-type air circuit breakers. Each of 36 feeders is protected by air circuit breakers, manually operated, trip free, with time-delay overcurrent protection, and instantaneous short circuit protection. The incoming line and generator breakers are also air circuit breakers but are

electrically operated and are mounted remote from the main switchboard. A station battery provides power for operating the electrically operated breakers.

In round figures 900 motors totalling 19,000 horsepower furnish the driving power for the many auxiliary and processing machines throughout the plant. By far the majority of these machines are constant-speed machines and require less than 50 horsepower in each case. Consequently, in the interests of low maintenance and simple drives, squirrel-cage induction motors are used with but a few exceptions.

Many of these motors are located in moist or corrosive atmospheres and some are subjected to splashing or dripping liquids, conditions commonly found in any paper mill. Adequate motor protection for these conditions is provided by employing enclosed motors or special insulation, and in extreme cases both.

In general, these squirrel-cage motor applications are as follows: open motors for driving main water-supply pumps, fire pumps, filters, compressors, splash-proof motors for driving vacuum washers, vacuum pumps, chemical pumps, stock pumps, agitators, beaters, Jordans, save-alls, and centrifugal stock cleaners; totally enclosed fan-cooled motors



SPLASHPROOF MOTOR drives Shartles Bros. Jordan. Rating is 125 hp., 514 rpm., 550 volts, 3 phase, 60 cycles.

SWITCHING and bus structure. Electrically operated generator breaker, left foreground. Note the precise conduit work.

for driving digesters, shake heads, bleachers, bleach pumps, chemical mixers, and in extreme conditions, for stock pumps, beaters and agitators.

Magnetic full-voltage starting control is used on all induction motors above one horsepower rating. These controllers are enclosed-type combination switches, with the magnetic contactors and fused line switch in the same enclosure. The switch operating handle is on the outside of the enclosure and is mechanically interlocked so that the door can be opened only when the switch is open, thereby protecting the operators from coming in contact with live parts. The operating handle can be padlocked in the open position preventing accidental starting when shut

down for repairs or maintenance work. These controllers give short-circuit, overload, and undervoltage protection.

Test jacks are incorporated in most of these controllers so that load tests can be made conveniently. One very interesting feature about this installation is that instead of locating each controller in the immediate vicinity of the motor it controls, all controllers are grouped in control rooms located at load centers throughout the mill. This makes a very neat arrangement and in many cases makes unnecessary the special enclosures that might be needed if the controllers were located out in the mill. In the case of motors smaller than one horsepower, nothing much is gained by the use of magnetic control

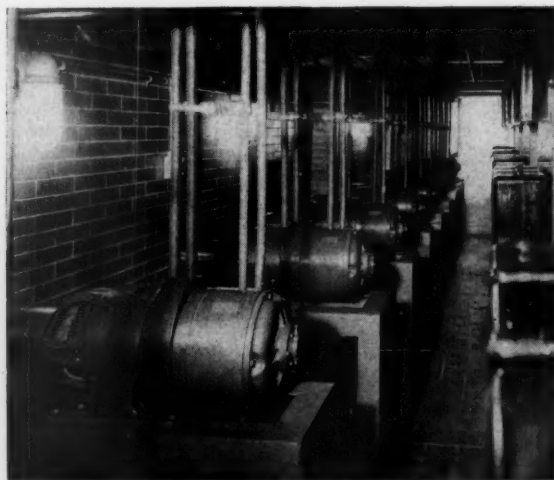
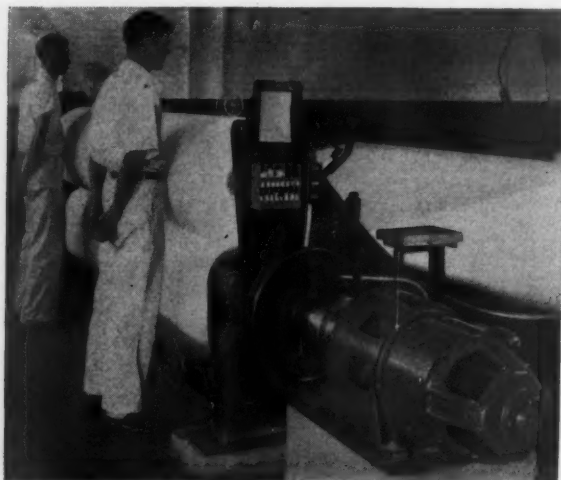
because a manual switch requires little, if any, more room than a push-button station; consequently manual motor starting switches are used on the small motors.

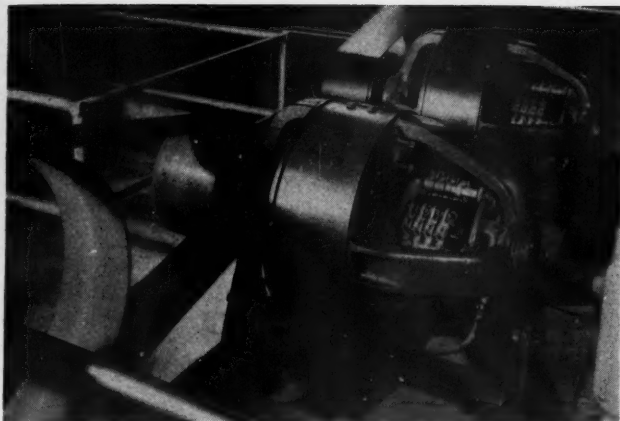
Each paper machine is driven by a single motor drive of the direct-current adjustable-voltage type with a four to one speed range. Each drive consists of a main driving motor rated 60 hp., 1150 rpm., 230 volts; a 50 kw., 250-volt induction motor driven motor-generator set with direct-connected exciter; induction-motor starter; adjustable voltage d.c. control panel; automatic speed-regulating equipment; and operator's control panel.

The motor-generator set with starter and the a.c. control panel are located

REWINDER driven by speed variator direct current gear motor, 5 hp., 144 r.p.m., 230 volts.

SPEED VARIATOR motor generator sets and control give precision control to remote machines.





OPEN SHUNT-WOUND direct current motors, 60 hp., 1150 rpm., 230 volts, Type CD-115, are belted to 112-in. paper machines.



CONTROL ROOM in Ecusta Paper Corporation plant. All controllers in this mill are grouped in rooms such as this for protection.

remote from the machine in a clean dry place. The operator's control panel is located near the paper machine convenient to the operator. The control provides automatic preset speed and automatic wash-up speed control. Assuming the MG set is running, the operator presses the start button on the operator's panel to start the drive on low voltage after which it automatically accelerates to the preset speed as determined by the setting of the speed-adjusting rheostats also located on the operator's panel.

There are two speed-adjusting rheostats, one coarse and one vernier to allow fine speed adjustment. If, while the machine is running at normal operating speed, it is desired to decelerate

to wash-up speed, the operator has only to turn the control switch on the operator's panel to the wash-up position after which the drive automatically decelerates to wash-up speed and is still under the control of the automatic speed regulator. This makes it unnecessary to disturb the setting of the speed-adjusting rheostats at any time except when the normal operating speed is changed.

If, for any reason, it is desired to operate without the automatic speed-regulating equipment, this may be done by turning the control switch on the operator's panel to the regulator off position. The speed of the drive is then controlled by means of the Raise-Lower push buttons on the operator's panel and

when the drive is stopped, the control interlocking is such that the generator voltage is automatically reduced to a suitable value for the next start. However, when operating without the speed regulator, upon starting the drive it is necessary for the operator to hold the raise button depressed until the desired speed is reached.

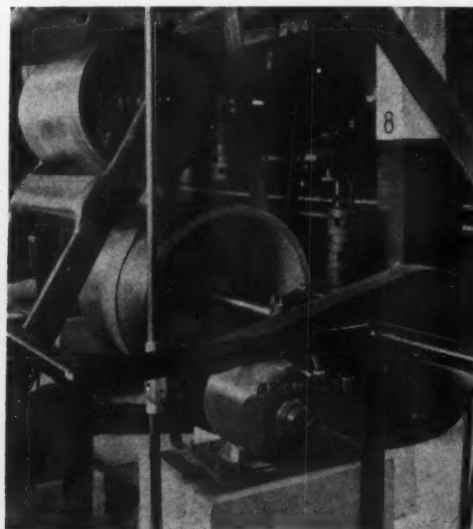
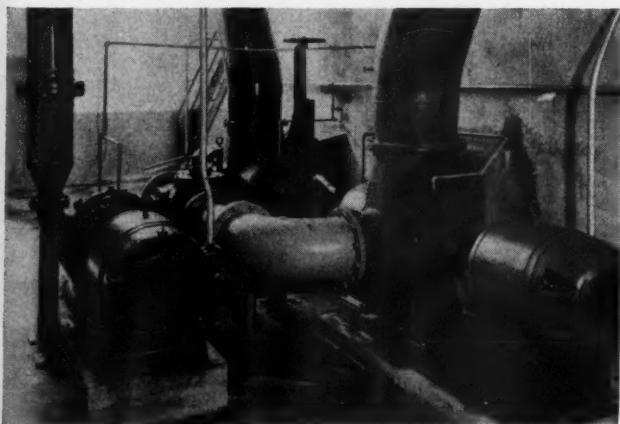
The automatic speed-regulating equipment consists essentially of an Alnico permanent magnet pilot generator, of "Diactor" generator-voltage regulator with its rheostatic element connected directly in the generator field, and a motor-operated follow-up generator field rheostat.

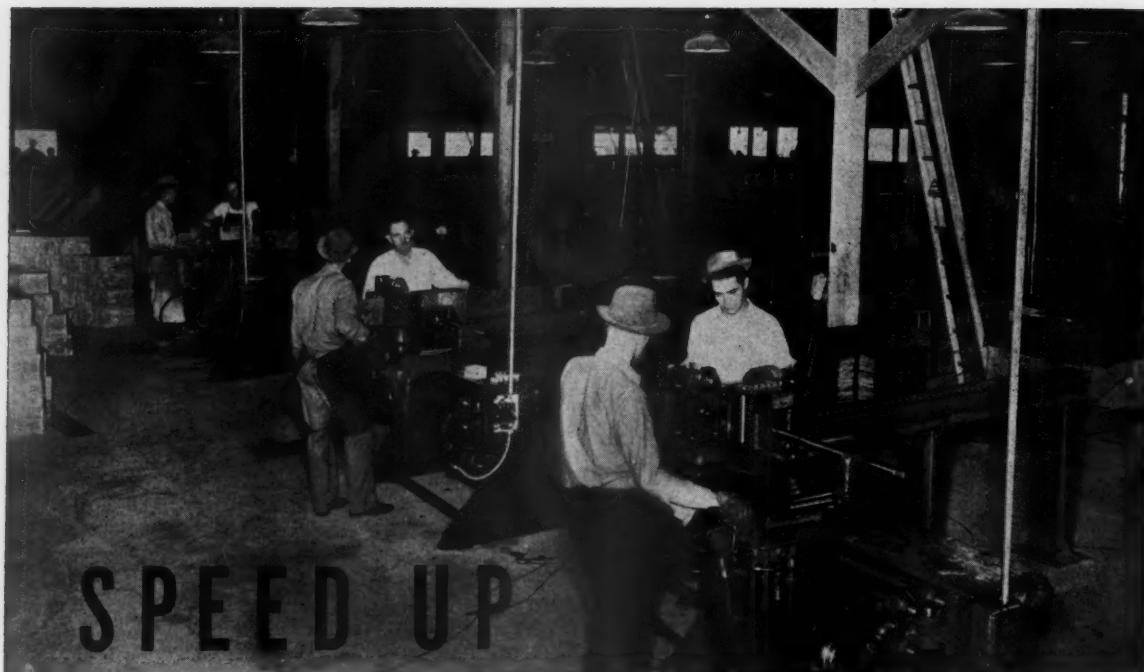
The pilot generator is driven from

[Continued on page 125]

ALNICO MAGNET pilot generator rated 1 ampere, 250-volt, 3000 rpm., chain driven from backline shaft of paper machine.

STOCK AGITATORS and stock pumps driven by 40 hp., 1800 rpm., 550 volt, 3 phase, 60 cycle totally enclosed fan-cooled motors.





With Special Tools

Advantages of proper job equipment are shown in a comparison table. Tools and machinery available to the job are a critically important factor in the contractors competitive position.

SKILLED craftsmen can work efficiently only if they have the proper tools. Likewise contractors, the craftsmen of the electrical construction industry, can operate their jobs efficiently and economically only if they provide their mechanics with sufficient quantities of the right type of tools and equipment. And this goes beyond the usual run of standard tools. It means the acquisition and use of the numerous "special" and power tools on the market today.

With the introduction of assembly line and mass production technique into the electrical construction field, ordinary hand tools have a very limited application. Where speed and economy are dominant factors, motorized and special power equipment are important. The distinct advantages gained by the use

of such advanced equipment is clearly portrayed by the attendant table.

Here, the equipment of two contractors doing conduit work on an industrial electrical job requiring 100 electricians with an output of 16,500 man hours per month is carefully analyzed. Contractor I is only partially equipped; Contractor II maintains a complete complement of tools, including all the special equipment necessary to expedite the work. This table, compiled by the Research Department of the Electrical Contractors Association of City of Chicago, was developed after a long tedious process of estimating a typical industrial conduit installation requiring the men and man hours listed, then determining the number of each type of tool needed and the time gained or lost due to the acquisition or lack of such equipment. Although

this is a hypothetical case, the data for the studies are based on actual experience of electrical contractors on large construction projects.

A careful study of the table shows that Contractor I spent a total of \$3,057 for all his tools, \$2,386 of this being for special equipment. Contractor II spent a total of \$7,585 for his equipment, of which \$6,878 was for special tools. What was gained by this seemingly large expenditure for "special" tools? By studying the "Hours Gained" columns of the table we find the answer. Contractor I saved 5,120 hours through the use of special tools. But, because he did not have enough special equipment and was even shy on some standard equipment he lost 835 hours wasted by men walking back and forth to get the tools and waiting their turn to use

MACHINE TOOLS speed war industry construction. A battery of bus bar benders in action for the Bennett & Forsberg Electric Co. at a Nevada war plant.

STUDY THIS TABLE to find out why well equipped contractors usually get the big jobs. It is a down-to-earth analysis of how conduit labor costs are affected by adequate tools on the job.

THE EFFECT OF ADEQUATE TOOLS ON CONDUIT LABOR COSTS											NOTE - TOOLS MUST BE IN THE HANDS OF TRAINED MEN IF RESULTS ARE TO BE OBTAINED		
BASED ON MAN-HOURS PER MONTH FOR A JOB REQUIRING A CREW OF 100 ELECTRICIANS INDUSTRIAL- 16,500 MAN-HRS PER MO													
KIND OF TOOLS	NO. IN USE	I-CONTRACTOR ONLY PARTIALLY EQUIPPED					II-CONTRACTOR FULLY EQUIPPED						
		PURCHASE PRICE		HRS IN USE		HRS GAINED BY USE OF	HRS LOST BY USE OF	NO IN USE	PURCHASE PRICE		HRS IN USE		HRS GAINED BY USE OF
		EACH	THE LOT	PER MO	THE LOT				THE LOT	AV. EA	THE LOT	SPECIAL TS	
STANDARD TOOLS													
PIPE VISE 1/2 TO 2"	12	3	36	90	1080			10	30	50	500		
PIPE VISE 2" TO 3 1/2"	12	5	60	105	1260			10	50	75	750		
PIPE BENCH SMALL	12	9	108	90	1080			10	50	50	500		
PIPE BENCH LARGE	12	15	180	120	1440			10	150	90	900		
WORK BENCH WITH TWO VISES	1	40	40	140	140		20	2	80	110	220		
STOCKS 1/2, 3/4 & 1"	6	6	36	90	540			10	60	50	500		
STOCKS 1 1/4 TO 2"	5	12	60	100	500		50	8	96	40	320		
STOCKS 2" RATCHET	3	17	51	90	270		25	3	51	20	60		
STOCKS 2 1/2 TO 4"	2	50	100	25	50			2	100	10	20		
SPECIAL TOOLS													ADV GAINED BY CONTR NO II
POWER DRIVE- THREADER	2	290	580	150	300	750	60	4	1160	150	600	1500	35%
CONDUIT BENDER-SMALL	2	145	290	145	290	440	60	4	580	110	440	660	
CONDUIT BENDER-LARGE	2	300	600	150	300	1200	60	3	900	130	390	1560	
UTILITY BENDER			180					1	180	130	130	260	
POWER SAW SMALL	1	250	250	145	145	290	60	2	500	120	240	480	
POWER SAW LARGE			350					1	350	140	140	700	
ELEC. DRILLS 1/4"	2	31	62	80	160	320	80	4	124	30	120	240	
ELEC. DRILLS 1/2"	2	57	114	90	180	360	90	2	114	50	100	200	
DRILL PRESS SMALL	1	50	50	135	135	270	40	2	100	90	180	360	
DRILL PRESS LARGE	1	120	120	145	145	435	45	2	240	115	230	690	
PUNCHES & DIES-WHITNEY	1	60	60	145	145	290	45	3	180	105	315	630	
ELECTRIC HAMMER	1	100	100	90	90	270	90	3	300	40	120	360	
AIR COMPRESSOR-PORTABLE			850					1	850	80	80	480	
WAGON TRUCKS	2	35	70	125	250	375	50	4	140	90	360	490	
ROLLING SCAFFOLD			200					4	800	160	640	1280	
ELEC. TOOL GRINDER- EL	1	90	90	120	120	120	60	4	360	60	240	240	
TOTALS			3,057			5,120	835		7,585			10,130	
						-835							
NET SAVINGS - 4,285													
SAVING NO I 10,130 GAIN BY NO II 5,845 MAN HRS /MO 16,500 = 0.353 SPEED OF JOB INCREASED 35% BY CONTR NO II													
GAINED BY II 3845													
ELECTRICAL CONTRACTORS ASS'N. OF CITY OF CHICAGO													

what power equipment was on the job. Thus his net saving was 4,285 hours. Contractor II, by having sufficient equipment on the job saved a total of 10,130 hours, thus gaining an edge of 5,845 hours over his competitor—a condition that is impossible for poorly equipped contractors to compete with.

From the economy and speed angles, Contractor II has the lead in both cases. By virtue of the 5,845 hour spread between them he can, based on the 16,500 man hours per month, increase the speed of the job by 35 percent

$$\left(\frac{5,845}{16,500} = 0.353\right).$$

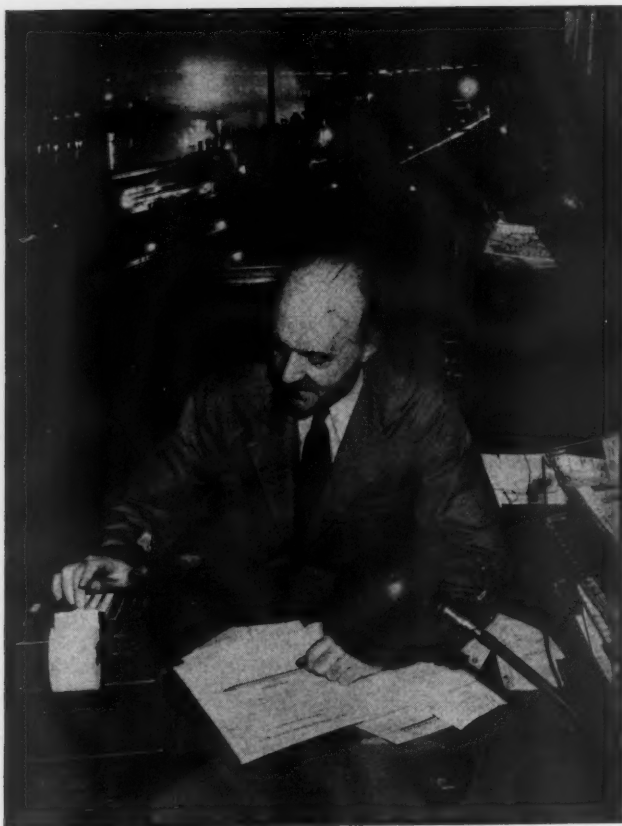
This he can do from the very start, since he has the tools on hand. Contractors who acquire their equipment as the job progresses, start off slowly and

never can quite overcome the lead of the firm that has all necessary equipment on the job at the start. And that is an exceptionally vital point, today, when construction schedules have been accelerated beyond the dreams of even the most progressive men in the field. From the standpoint of economy—the 5,845 hour gain over his competitor would mean a saving to the customer, based on a rate of \$1.50 per hour, of \$8,772.50.

If we consider return on additional tool investment, Contractor II spent \$6,878 for special tools which saved him 10,130 man hours, or \$15,195—better than 220 percent. And this is on just one specific job. He still has the equipment for other jobs and his only additional expense would be the repair parts and normal depreciation.

One of the answers to the oft repeated question, "How can large contractors figure such low costs?" lies in the accompanying chart. Plain figures tell the story. The contractor who is willing and able to invest in equipment will always have the edge. It also shows how meaningless a "rate per hour" quotation is unless the facilities to handle the job are investigated. Two competitors may quote the same rate, but one of them may be able to do the job in half the time. Plenty of the right type of equipment handled by men who know how, plus the ability to expedite the job, are big selling points for contractors seeking "cost plus" work. Today, the man who can do the job the quickest comes out with the signed contract.

WARTIME Credits and Collections



SOUND CREDIT and collection practices are important in round-the-clock schedules when men and materials must be carefully distributed.

An accountant specializing in the electrical contracting business points out the pitfalls of credit in wartime.

By Arthur Roberts

appraising the credit risk. Consider first the customer's chances of remaining in business with allocations and priorities and ceilings making further inroads with each passing day into profitable production and distribution.

Wartime credit is critical for credit granters and credit seekers of all kinds, including banks, and, of course, electrical contractors. There are no yardsticks to follow because the present war dwarfs all previous wartime financing, hence, the entire subject must be studied in the light of new conditions. Although the problems are difficult, the contractor can minimize hazards by taking greater care with credit than ever before instead of being more lax, and discussing his credit problems with his bank, association or the local Chamber of Commerce. Not only must each member of this industry fortify his position with up-to-the-minute information on credit and collection problems brought about by the war, he should know where he stands in his own credit relationship to others, his suppliers and bank. If you analyze working capital requirements periodically, as you should do, and there are indications that you may need funds eventually, consult your banker beforehand. Do not wait until you need a loan because then you may find that you have done certain things during this period that nullify your chances, actions that could have been prevented, had you sought advice in advance. Industrial work usually involves substantial quantities of material and this means that you must have ample funds of your own or be in a position to get credit for your

(Continued on page 71)

BECAUSE money and good paying jobs are plentiful and business is comparatively easy to get if one has the salables, many electrical contractors have relaxed their vigilance on credits and collections, which may lead eventually to the need for lots of aspirin. Despite the fact that money is as abundant as flies in a cow-shed, this is no assurance that creditors are safer risks today than in peacetime. Rather, the reverse is true, say experts on credits and collections. Even during the depression periods, the risk was less, because wartime restrictions, high taxes and price ceilings increase the hazards of granting credit to the industrial market, which looms large for electrical contractors at this time. Almost all normal sales activities have been suspended so contractors are shifting to the industrial field where material restrictions are less drastic and the demand for "all-out" production offer big selling opportuni-

ties, particularly in the industrial lighting field. Light speeds up production, factories can be sold better lighting without a great deal of effort but don't relax your vigilance on credits and collections. Investigate prospective purchasers closely and maintain an efficient collection system to make sure you get your money when due. Remember that a sale isn't a sale until the coin is in the till.

The system of priorities on vital materials may well endanger the business of an old-line manufacturer of civilian goods who has enjoyed a sizable line of credit in the past. In this regard, electrical contractors must follow the lead of bankers. The credit departments of banks are paying less attention to current financial statements of prospective borrowers than to the problem of figuring out a customer's chances of surviving and repaying the loan. This is a cue for the contractor to follow when



GENERAL office areas use continuous rows of units on 7-foot centers.

Glass Covered Troffers

An office lighting job geared to wartime efficiency uses recessed fluorescent troffers with diffusing panels.

ONE of the noteworthy installations of 1942 is found in the headquarters offices of the National Gypsum Company, a new building lighted entirely with glass-covered fluorescent troffers. Each 4-foot unit employs two 40-watt white fluorescent lamps and the metal frames which hold the cover glasses are hinged on one side, thus making the troffer interior easily accessible for lamp replacement.

The accompanying view of the large first-floor general office area shows a typical office installation. Around 50 foot-candles in service is provided by the continuous rows of these units recessed in acoustical ceiling material. The rows are on 7-foot centers. Light desk tops add to the visual comfort.

A variation of the conventional troffer system is employed in the private and outer offices of this building. In a third floor outer office, for example, the units are located in a hollow rectangular pattern, the rectangles themselves being 4 by 6 feet over-all and on 7-by 10-foot centers. The average illumination level in service is 50 to 55

foot-candles. Even the basement lunch and noon-hour recreation room has about 50 foot-candles of comfortable lighting from 56 recessed troffer units.

The role which working environment plays in promoting office efficiency was studied in a series of tests conducted with seven average female employees just before leaving the old building and

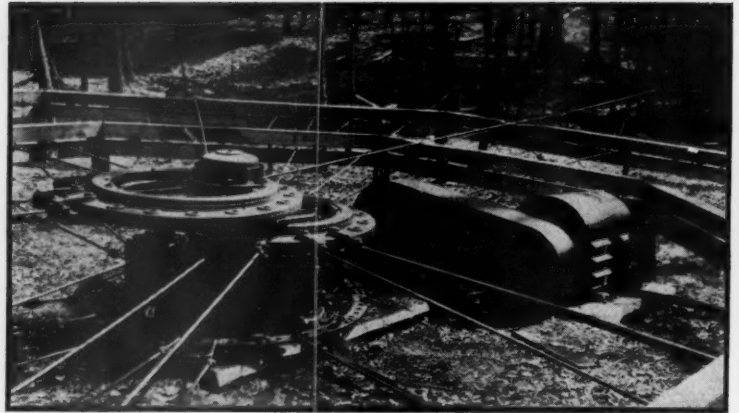
repeated in the new offices just described. The experiment was conducted by a member of the Psychology Department of the University of Buffalo and showed that in the new building the workers are 28.9 percent more alert and 20.5 percent more accurate while their work output increased 36.4 percent (number of words typed). The former building was noisy, the employees were crowded and the illumination was inadequate (around 12 foot-candles of indirect lighting). The results are significant in proving the value of comfortable working conditions.

This outstanding fluorescent installation was made by the Beacon Electrical Engineering and Construction Company, of Buffalo. The architects were Bachus, Crane and Love, also of Buffalo.



VARIATION in layout gives efficient illumination plus an attractive pattern in the cafeteria.

CENTRAL POWER, 30 hp. motor, enclosed drive and gear box operate eccentrics. Radial jack rods extend through supporting sheaves to mechanical pumps at well locations.



THE steady decline of natural gas production has forced the oil-field operators in this area to turn to other forms of energy for driving purposes. Formerly gas engine drive was used almost exclusively, except for a few steam engines, natural gas being piped from the previously drilled well to the new "location." However, so much water has been applied to the oil-bearing sands that this gas has all but disappeared. The first thought was to convert to oil engines (and some did) but this entailed not only the continued use of bulky, heavy equipment but also increased maintenance due to oil being a "dirtier" fuel. Then electric drive was made available by the extension of three phase power lines into practically all the producing areas by the operating utility.

The most interesting development has been that of electric drive for cable tool drilling. A unit for this type of operation consisting of a 25/65 horsepower wound rotor motor with nine steps of speed control both forward and reverse was developed by Westinghouse. It could be assembled on a small sled. This unit was extremely light and portable in comparison to the heavy and bulky oil engine. An important consideration since wells can be completed in from 20 to 30 days after which the equipment must be moved to the new location. Moving distances run from several hundred yards to several miles.

The work of running the electric lines, maintaining and moving electric equipment and making the various temporary

Electric OIL-FIELD

Pennsylvania oil producers are adapting electric drive to

and permanent installations is handled by electrical contractors, some specializing in this type of work. A few of the larger companies employ permanent crews for these continuous installations.

Primary lines, generally 2000 volts Y, are strung from the utility lines to the center of the property. Transformer banks and metering equipment are set and 440 volt secondary lines run on temporary poles to the particular location to be drilled. As the preparations are completed, permanent lines are run in to an individual jack which is set to

pump the fluid from the drilled hole. The horsepower requirements of these jacks depends upon the speed of the pumping and depth of the well, but in general average from two to five horsepower and the jacks are available with either three or five horsepower motors.

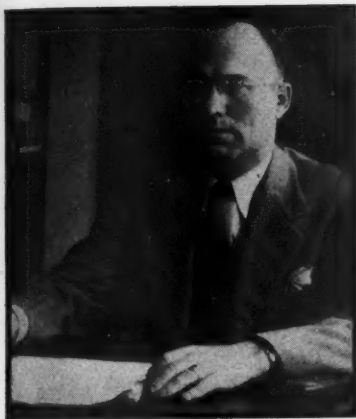
Time Clock Control

Automatic time-clock control is used since the operation of the jacks vary from 15 minutes to 24 hours a day depending upon how much fluid collects in the pocket at the bottom of the hole. Once this pumping time has been established, the time clock is set and requires checking only once or twice a week. Thermal overload relays protect the motor, and lightning arresters protect the time clocks. Overloading presents a serious problem. It is caused by an accumulation of wax in the well which clogs the hole. This, of course, can increase the required horsepower and damage the motor if overloaded devices are not properly installed and maintained. In some cases, where it has been found economically advisable, single and reverse phase relays have been installed. Time-delay fuses have also been used for guarding against single-phasing.

Since a radial feed system is used in this area single-phasing is perhaps the most formidable problem encountered



PUMP JACKS in the field electrically operated from overhead lines.



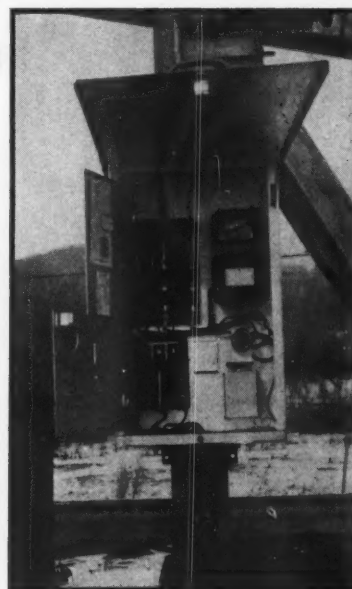
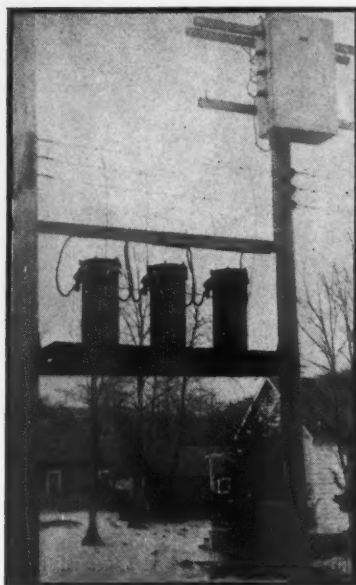
By H. O. MURPHY

*Lloyd-Smith Co.
Bradford, Pa.*

DRIVE

all phases of production.

CONTROL PANEL rated $7\frac{1}{2}$ hp., 440 volts for pumping motor is enclosed in weatherproof cabinet with a hinged shield over live parts. It includes a time switch and lighting protection.



TYPICAL SERVICE, 7500 volt Y line connection to cutouts, primary metering equipment and three 15 kva. transformers. Secondary is 440 volts delta.

and many small motors have been burned-out simply because they lacked protection. However, in most cases it has been found cheaper to rewind the damaged motors than to install single phase protective equipment since in the over-all picture the percentage of burn-outs is small.

Another advantage of time-clock control is that since the majority of the pumping jacks average only a few hours operation in 24 hours, the jack schedules may be staggered in such a way as to keep the demand at a minimum. This can be seen to be very advantageous when as many as 300 or 400 of these jacks are metered on the primary at one point, and thus their total demand of 1000 or 1200 kw. can be cut to 300 or 400 kw.

Central Powers

Another method for pumping the oil is the use of "central powers." An electric driven gear box turns an eccentric from which rod lines are run radially to the wells. In this manner many wells may be pumped at one time but the demand cannot be kept to a minimum as with individual units and the friction losses in the gearbox, eccentrics and rodlines run relatively high.

Electric drive has also been applied to

the water pressuring phase of oil production. Deepwell turbines bring the water from the ground to the storage tanks and after a filtering process the water is brought up to surface pressures varying from 200 to 2000 pounds per square inch by electrically driven duplex pumps. This water is then applied to the oil bearing sand to drive the oil into previously drilled pockets from which the fluid is pumped. The pressure pumps are a 24-hour load but if stock tanks are large enough the deepwell turbines can supply enough water by operating, for example, only 25 percent of the time. An ingenious device known as a time-cycle timer is used in the control circuit of the turbine so that it operates only a portion of the time required to record an integrated demand. In other words, if the power company uses a 15 minute integrated demand meter and the turbine has instantaneous demand of approximately 40 kw., the time-cycle timer would be set so that the motor would be "on" for $3\frac{1}{4}$ minutes and "off" for $11\frac{1}{4}$ minutes. Thus on a 15 minute integrating demand meter only 10 kw. would register instead of the 40 kw. which would register if the motor were allowed to operate the full 15 minutes. By cutting demands in this manner enormous annual savings are effected.

The trend of electric horsepower has

risen from 4000 hp. in 1932 to 18,000 hp. in 1942. This will give some idea of the potentiality for the electrical contracting business in the other great oil fields of the country where this transition to electric drive has not been so marked. The Pennsylvania field has probably taken the lead here since the oil producing areas are adjacent and comparatively concentrated, enabling the power companies to cover the area with three phase power lines. Midwest and western fields have not been so fortunate in this respect for their producing areas are quite widely scattered, and up to now the majority could not be reached with power lines. However with the return of peace conditions and the consequent abundance of material, these fields will probably be served and quickly electrified. The oil industry is not only vital in war but vital in peace, and its tremendous growth in the past will continue in the future at an ever increasing rate. The load is composed almost entirely of small motors of 3, 5 and 10 horsepower each one of which requires a pole line secondary of some length, and control which includes time clocks, single-phase and reverse phase, lightning and overload protection. This new application of electric drive will produce enormous requirements on the electrical industry.



1 COILS ARE WOUND on this winding head, then placed on portable bracket (arrow) to start the journey through initial inspection, dipping and subsequent operations.



2 INSPECTION TABLE where the coils go through a series of three inspections. Note the portable brackets (arrow) which fit into vertical conduit nipples.



3 RAPID TAPING of the coils follows the spreading operation and the second dip, bake and inspection. Color coded sleeving has been previously placed over coil ends.

Mass Production of COILS

How a Kansas City motor shop set up a special mass production line to make some 10,000 coils under a war subcontract to a large motor manufacturer.

By John E. Launder,

President, Independent Electric Machinery Co., Kansas City, Mo.

WE have found a way in which our shop could do more than just normal repair work to aid the war effort. The answer is subcontract manufacture and assembly operations, on a relatively small scale of course, for large electrical equipment manufacturers.

When the Electric Association of Kansas City canvassed its membership to determine what they could do in the way of handling war subcontracts, our shop was among a group of 12 who offered their services and facilities. On the strength of our experience, shop facilities and personnel, we were able to secure two subcontracts from Westinghouse Electric and Manufacturing Co.; one to assemble some 600 to 700 motor armatures; the other to make approximately 10,000 armature coils—all the same size and design.

Our first step was to set up a mass production coil department entirely independent from the rest of the shop. By doing this, we could still handle our normal volume of repair work without interfering with the coil production.

Lack of time prevented us from enclosing this department in a separate room as we had planned. This will be done, however. At present, we did the next best thing—locate the department at one end of the shop.

Type of Equipment

This department has its own equipment, separate from the other shop machines, so there will be no time lost through its use for other than this specific contract. The equipment includes:

1. A gear-motor coil winding head with an integral work table, magnet wire-spool support and portable coil bracket.

2. A coil spreader with a permanent setting for this particular size and type of coil. This can be reset for other work later.

3. An insulation stripper for stripping coil ends.

4. A long inspection bench that permits working from either side. The bench, located in the center of activity, is divided by a long row of vertical conduit nipples which hold the portable coil brackets described more in detail later.

5. A special machine with an expanding block to form the necessary arc in the coils.

6. A taping machine.

7. A converted taping machine equipped with a thread bobbin for tying



4 SINGEING COILS eliminates the lint and fuzz of the linen tape, producing a smooth surface after final dip and bake. Conventional forced-air gas flame is employed.



5 ELEVATOR DIP RACK permits lowering groups of coils into the insulating compound. Portable brackets fit on rack. Dip tank is on casters for added flexibility.

color coded sleeving to the coil ends. No. 40 thread is used.

8. A forced-air gas torch for singeing the lint and fuzz from the linen tape on the coils.

9. A portable dip tank with an elevator coil rack that can be lowered into the insulating varnish.

10. A portable stand for coil racks—permits moving a large number of dipped coils to the bake oven.

11. The conventional bake oven to give the coils two preliminary and one final baking.

A unique feature of the assembly line technique employed is the portable coil bracket which can be moved from and mounted on the winding head, spreader, inspection table, dipping tank rack, and other equipment. The bracket is made of a 16½-inch piece of 3-inch sheet steel, bent in a "U" shape and fitted with a pin stop at one end and a ½-inch by 5½-inch steel mounting pin at the other end. This pin telescopes into a supporting pipe nipple welded to the shop equipment. Each bracket has a capacity of 35 "hairpin" or 25 "spread" coils.

Production Steps

With this equipment as the backbone of our new department, we inaugurated our mass production line. Fourteen different operations are involved from the time the magnet wire leaves the spool until it emerges at the end of the line

3. Initial dipping and first 8-hour bake. After each dip, coils are suspended from coil rack for one hour, then turned end-for-end to distribute varnish and prevent deposits on knuckles.

4. Spreading of coils

5. Stripping and tinning of coil leads

6. Applying color coded sleeves to coil leads

7. Second inspection

8. Second dipping and 8-hour bake

9. Taping of coils with linen tape

10. Blocking coils to get necessary curvature

11. Singeing coils to remove lint and fuzz from linen tape

12. Third dipping and 8-hour bake

13. Final inspection

14. Assembly of coils into sets ready for shipment. One set includes enough coils for a complete motor armature.

Manpower Problem

How could we take on this additional production with the present scarcity of skilled labor? The answer is women. We employed five girls to work in this new department. Under the strict supervision of our shop foreman, they have developed into capable and efficient operators.

[Continued on page 71]



6 PRE-BAKE AIR DRYING on this portable rack permits even distribution of varnish. Coils are turned end-for-end to eliminate varnish deposits on knuckles. Note portable coil bracket (arrow).



7 READY FOR SHIPMENT after final baking and inspection. Each bundle of coils represents the correct number for a complete motor stator. Bundles are packaged in cartons for shipment.

Editorials

W. T. Stuart, Editor

Extending Farm Kilowatts

The recent action of WPB in releasing, up to April 1, certain types of copper wire from its frozen stocks to expedite construction of urgent rural electric line extensions, is a break that farmers have long needed. Every kilowatt that can be extended to present undermanned farms means additional production. And with the farm labor situation at its most critical stage, this possibility cannot be overlooked.

But the lines are only the starting point. The farm production we so badly need cannot materialize unless the farmer can get wiring materials for his buildings and equipment for his tasks.

The problem now lies in the hands of WPB agencies. A coordinated effort is needed to release related equipment so the kilowatts on the lines can be put to work. Perhaps a system for the electrical work, similar to that for defense housing could be evolved.

The food situation is serious. The sooner steps are taken to help our farms produce more, the better it will be for all concerned.

Navy Needs Construction Men

Uncle Sam's Navy wants experienced construction men. Within the next six months, the Construction Battalions (C. B.'s or Seabees) will need 100,000 skilled building trades workers and 4,500 officers and warrant officers with experience as superintendents, foremen and engineers on construction.

Applicants between the ages of 18 and 38 will be recruited through Selective Service and induction centers;

for those between 38 and 50 certain physical requirements have been relaxed so their specialized experience can be available to the Navy.

The expected decline in construction to about 25 percent of the 1942 peak will release some 1,000,000 construction workers. Here is an opportunity for these men to redirect their skills to the building of bases from which our fighting men can push on to victory—construction that is just as vital as the type they have been doing. And the adventure connected with foreign duty will undoubtedly appeal to many.

Those interested are urged to place themselves on record with their local Naval Officer Procurement Office. Commissions will be available for those possessing officer qualifications.

Small Shops Have a Place

To sidestep being a wartime casualty is the current headache of many a small motor repair shop. Caught between priority restrictions on one hand and lack of personnel and equipment to handle large war plant work on the other, they are left to sink or swim.

One Midwest shop decided to swim hard and has succeeded in riding the wave of wartime work. He did it by subcontracting the small motor work of several large shops who are so swamped with big repair jobs that they just can't handle the small stuff and make deliveries on time.

When the armed services took 90 percent of the shop employees, the owner went to the USES, hired girls who possessed an aptitude for mechanical work and is now delivering the goods.

A helping hand, in the form of subcontracts from large shops has saved

the business neck of this capable small operator, plants are getting their repair work on schedule, industry relations and good will are strengthened.

Through individual initiative and industry cooperation a small but important segment of industry was kept running and converted to war work. And that helps win the war.

An Eye to the Future

The Electrical Insurance Trustees, a liaison group between Chicago electrical contractors and their union employees, has seen the handwriting along the construction front. As a result they are sponsoring a series of advertisements in local papers urging mechanics affiliated with the Building Trades Council to swing over to maintenance work, once their present construction jobs come to an end.

This is a logical step to stabilize the employment of skilled electricians and place them where they can do most good as the construction front declines. They are the ones who installed the electrical systems that operate our war plants and know the circuits by their first names. They should be a welcome addition to already overtaxed plant maintenance staffs working around the clock. They have the skill and experience and need no training sessions.

It is hoped that labor will see fit to adjust its rates commensurate to year around employment and that jurisdictional problems will be eliminated in the light of our country's need for increased production and the already stringent shortage of skilled men.

The Bars are Lowered

Unfortunately, it takes a war to fuse a spirit of cooperation that should have played a big part in our industrial picture of the past. Competition had shrouded new ideas and production kinks in a veil of secrecy. Now, the only competitors are the Allied and Axis Nations—competitors for existence in the present world of strife. And to make sure that we come out on top, industry is pooling patents, ideas, tools, resources, engineering talent—all to a common end—victory on the home production front.

The electrical industry is up in front doing its part in the manufacturing, construction, maintenance and inspection fields. Contractors are rushing large war plants to completion in joint venture projects; repair shops are exchanging shop ideas; wherever possible inspectors are relaxing codes to promote saving of critical materials; maintenance men are releasing their bread-and-butter kinks used to keep their plants in operation during emergencies.

Dramatic evidence of this new spirit of cooperation was found in a recent War Production Clinic, sponsored by the Engineering Societies at the request of WPB in Indianapolis. While the city lay quiet under a practice dim-out, some 1100 key men of surrounding industries assembled in panel discussions to exchange down-to-earth "how-to" information on speeding production and keeping plants operating around the clock. Trade secrets, personalities, petty jealousies, were forgotten as these men tossed around ideas that would help out the other fellow, and keep war material flowing.

It's cooperation of this type that will win this war and make for a better post-war industry. Yes, the bars are being lowered and as a result we will have a progress and advancement that will be a credit to science and industry.

Action First

For want of medical care, the patient died. Those might be the terse words that spelled fins for an emergency case if our hospitals had not eliminated red tape. Fortunately, for the patient, action is taken first, and questions asked later.

Industrial plants are somewhat in the same category during the present emergency. A neighboring plant may urgently need a piece of equipment or some construction material to maintain operations during an emergency breakdown. Can they get it from one of the other plants in a hurry? One maintenance man in answering the question explained that they might have the material but it would be earmarked, they couldn't get any more and anyhow it would take too long to go through their red tape to be of use.

The cooperative spirit here is being checked by red tape, bookkeeping and regulations. Contractors and motor shops, being smaller can lend a helping hand without fear of such obstacles.

But industrial plants have this problem to solve.

We are at war and plants must keep operating. The other fellow may be making a component part of a war machine and his operation may be just as vital as yours. In such emergencies red tape must be cut to the bone.

Or, if this can't be accomplished, lend the material when it is needed and go through the red tape later. Action is needed first. Questions can be asked and answered later.

Books for Victory

The Victory Book Campaign is collecting books for our men in the armed forces. On the lighter side, the preference is for current best sellers, adventure, detective, mystery, sea and western yarns; and humor in fiction and cartoons.

But the fellows who want these books are not a breed apart. They have interests, too, in technical progress. They realize their serious responsibilities in post-war civilian life. Many of them interrupted college courses and professional careers to enter the Service.

So the Campaign is making a special plea to those in business and industry who have technical books at home or in the office. Texts published since 1935 on architecture, aeronautics, chemistry, drawing, machine design, mathematics, meteorology, navigation, photography, physics, radio, shop mechanics and engineering are wanted.

Here is a direct contribution to the morale of our services and the future of our industry that we can all make. Take your books to the nearest public library. There they will be packed and sent off to fighting forces.

New Work Week

The executive order of February 9 establishing a 48 hour week for the duration in spite of its simple terms is extremely complicated in its effect on industry and trade over the country.

Applying at the outset to 32 specific labor shortage areas, it will unquestionably be extended to other areas as soon as the overall effects on the economy become apparent.

There are some of its provisions which are perfectly definite—it applies

to all full time employment whether war connected or not. It applies to the office worker as well as the skilled craftsman or laborer.

Should firms in other areas try to go on the 48 hour week? WMC says yes, if by so doing they can reduce their labor requirements.

The effect of the order on war workers is practically nil. The average work week on war contract industry is very close to 48 hours with time and one half for all over 40 hours. The effect, however, on other industries is still to be weighed. There are still plenty of business ventures and services which are vitally essential to the war and civilian existence which do not contract directly with government agencies but live under rigid price ceilings.

Whether these firms can pass on the increased costs to their customers depends on OPA regulations. Characteristic Washington thinking is evident in the explanation—"but it is unlikely that the increased labor cost will add more than a small fraction to the cost."

Profits, too, are a small fraction of the cost. It is to be hoped that OPA and WMC will use sound business judgment in permitting adjustments to the new work week.

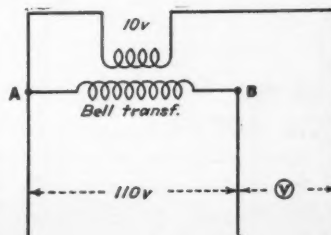
Back Talk

Our Apologies

To the Editor—"Diagram 5 on page 26 of your January 1943 issue is incorrect. The voltage 'V' should be measured between the point 'B' and the unidentified line rather than between point 'A' and the unidentified line. The diagram illustrates the method of checking for polarity on a small bell ringing transformer. If 'V' reads less than line voltage, transformer secondary connections must be reversed."

M. A. Havenhill
Illuminating Engineer
Kansas City Power & Light Co.
Kansas City, Mo.

Which just goes to prove that the best way to hide a bass drum is to hang it over the fireplace. The error in the original diagram is obvious. Here is the corrected diagram.



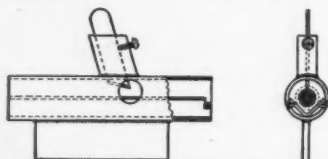
Methods

BRIEF ARTICLES about practical methods of installing and maintaining electrical wiring and equipment and up-to-date estimating and office practices. Readers are invited to contribute items from their experience to this department. All articles used will be paid for.

CABLE STRIPPERS

WIRING

A method for stripping all sizes of scrap electrical cable has been submitted to the War Production Board by John A. Richards, Moore Drydock Co., Oakland, Calif. Various sizes of scrap steel tubing a foot or so long are selected for the guides. A slotted block is welded to the tubing and the cutting knife in-



CABLE STRIPPER to remove insulation and leave copper in its original form. Both rubber and copper may be salvaged.

serted. A set-screw is used to hold the knife securely in position. The knife is then set to the right cutting depth and the cable is fed through from right to left (see sketch) against the point of the cutter. It is then quite simple to peel off the insulation enabling the salvage of two critical materials instead of one.

To accommodate smaller sizes in the same tube a V-shaped insert is used as shown. Little time is required to make the stripping assembly and much saving can be made by its use.

The amount of rubber which can be salvaged in this manner may seem insignificant to the individual, but on a national scale its volume is impressive.

INFRA-RED PACES CONVEYOR

INDUSTRIAL

Infra-red has found many uses in heating and drying applications. In its use at H. & S. Book Binding Co., St.

Louis, it has become associated with a conveyor for a drying operation.

H. & S. has to dry gum backings on stickers and labels during 40 ft. of travel on the conveyor in one minute. An oven built around the conveyor proved too cumbersome. Also atmospheric conditions caused variations in degree of drying.

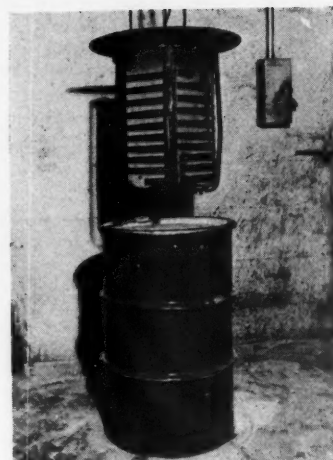
The solution was to mount a bank of infra-red lamps, 9.6 kw., seven inches above the work. Now, with the set-up the output keeps up to conveyor speed at all times and the quality is uniform.

FATS ARE AMMUNITION

INDUSTRIAL

Housewives, bakeries, restaurants and other commercial establishments have been asked by government officials to save their waste fats, oils and shortenings. They have been put on the essential critical materials list as vital to our ammunition industry.

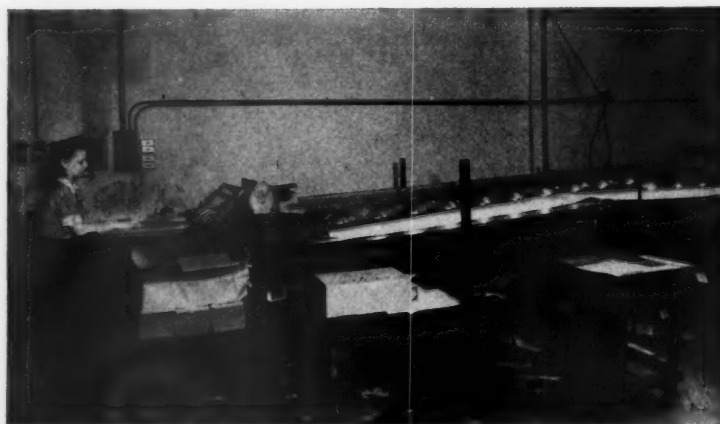
G. R. Parry, industrial engineer,



STRIP HEATER wound on asbestos covered drum for melting fats from barrels.

Metropolitan Edison Company of Reading, Pa., was visiting Maier's Bakery also of Reading where he happened onto one of the employees, or rather the lower half of the employee, for his top half was lost within a shortening barrel from which he was scraping the last obtainable bit from the bottom. To do this took quite some time and still eight pounds remained in the barrel. Parry suggested that they melt it out.

He took a 3.8 kw. stripheater element and wound it about a six-sided asbestos insulated drum. The element was made long enough so that it could be coiled up on the bottom in somewhat the same manner as a range element since a concentration of heat was needed at the bottom of the barrel. Six flat-steel strip guides were attached in order to protect the heating element from short circuiting on the sides of the steel barrel, and a lid of the same diameter as the barrel was placed above the element to keep most of the heat within.



INFRA-RED LAMPS plus conveyor aids in assuring uniform quality of work produced by H. & S. Book Binding Co

Timely tips
from
the Wartime
Lighting front

Salesgram

BOB BISHOP
SALES MANAGER

SYLVANIA

ELECTRIC PRODUCTS INC.
Salem, Mass.

Incandescent Lamps
Fluorescent Lamps
Fixtures, Accessories
Radio Tubes
Electronic Devices

FLUORESCENT LAMP MANUFACTURE restrictions hit only 5 per cent of business. Permitted daylight and 3500° white always accounted for 95 per cent anyway.

FLUORESCENT PROGRESS AND POTENTIAL indicated in Sylvania's survey of thousands of war plants. Gist herewith released for first time: 67 per cent have some fluorescent lighting --- 14 per cent have more than half plant so equipped; 22 per cent have more than 40 per cent.

Significance: SOME GROWTH! And in only three years --- a total fluorescent market of \$100,000,000. Compare that with automotive and radio records. Probable reason for phenomenal growth: declining cost of manufacture plus technical improvements mean that, with 40-watt white lamps, for example, the fluorescent user gets 7 times the total lumen-hours for his money today compared with 1939.

BUT DON'T FORGET THE 33 PER CENT (see above). This is a huge virgin market, in addition to possibilities of extending fluorescent-use in plants already installed.

PRETESTED SALES PATTERN might help. Lighting represents only 2 per cent of manufacturing industry's capital, only 3 mills out of its operating dollar. Peanuts, considering that lighting is indispensable to efficiency. Scientifically installed fluorescent lighting has increased production by as much as 20 per cent in many plants. And fluorescent gives more than twice the light output for the same wattage---usually on the same wiring.

BLACK-OUT LAMP SALES restricted to Army, Navy, Maritime Commission---Uncle Sam needs entire production for primary war use.

STOP PRESS! New Sylvania fixtures with COMPOSITION reflectors not only save metal but are sweeping the war plant installation field. Up-to-the-minute design ups special MIRACOAT reflector to 86 per cent---above pre-war porcelain enameled steel. Strong enough for hardest service yet light enough for speediest maintenance....speaking of which, the rugged spring-type CAPTIVE LATCH is also a timesaving feature on which Sylvania holds exclusive patent. Latch stays put while in service, but give it a quarter turn and---presto---the reflector is off for cleaning.

P&S
(time-tested)
PORCELAIN
Wiring
DEVICES



Just as P&S PORCELAIN WIRING DEVICES installed years ago are still serving faithfully—so new installations of these devices will serve long after this war is won.

Ask for complete information.
 Sold through Electrical Wholesalers

PASS & SEYMOUR
 INCORPORATED
 SYRACUSE, N.Y.

Methods

[FROM PAGE 40]

By using this device, Maier found that better than three of the eight pounds of shortening was salvageable, the remaining four plus pounds evenly coating the inside of the barrel. Consequently the melter paid for itself in a very short time. Maier claims that this melter saves him between 550 to 600 pounds of shortening each month, which is a lot of shortening.

CAPACITORS CUT DEMAND

—INDUSTRIAL

According to engineers of the Illinois Central Railroad where a 300 kva. capacitor was installed at Paducah, Kentucky, a savings of \$485 in annual demand charges or 16 percent of the total investment will result. The capacitors are connected on the 460 volt side of a bank of three 500 kva. 6900/460 volt transformers. The average demand per month on this bank is 1250 kv. Power factor was also improved from approximately 60 to 70 percent.

EASY LIGHTING MAINTENANCE

—MAINTENANCE

Problems of installing and maintaining lighting, overhead cranes, electrical installations, etc., used to be a hazardous undertaking in this plant. Now with the aid of an Economy "Hi-Reach platform Telescope" the dangers have been entirely eliminated.

The baseframe is only 32 inches



OPERATOR is installing mercury lamp fixtures at a height of about 15 feet above the floor.



CHANGING CONTROLLER fingers and segments on a crane controller which is 22 feet above the floor, used to be a hazardous undertaking, now look how simple it is.

wide by 55 inches long and makes it easy for the operator to pull the Telescope through narrow aisles and between machinery on the floor where even a step-ladder could not be used. The hoisting unit holds the platform at whatever height raised. Also, an automatic cam type clutch holds the platform with no danger of it coming down until the operator cranks it down.

BLACKOUT MARKERS

—INDUSTRIAL

Total blackouts in some industrial plants are effected by opening the substation or power plant main switches after 10 minutes notice has been given to machine operators and furnace men to enable them to shut down their machines and cut-off gas, water and steam supply. Consequently, when the main breakers are open, no auxiliary supply is available to feed blackout lamp circuits. Since the copper and equipment required to run these blackout circuits back to the substation for energy, are either unobtainable or too costly, industrial establishments are resorting to other methods.

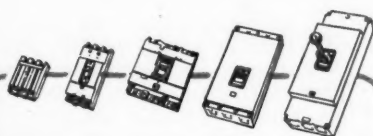
The electrical maintenance gang of the Oil Well Supply Co., Oil City, Pa., has made up quite a number of aisle markers from dry cells, tin sheet, and ordinary flashlight bulbs. The shade is made into a cone shape and soldered to a holder which can either be stamped or cut with tin shears. Two ears on the holder are bent inward to make a spring clip to hold the bulb in place. The holder is then secured to the negative terminal, and to turn the lamp "on", the nut of the positive terminal is screwed up against the tip of the bulb.



no "A. W. O. L.'s" here

WESTINGHOUSE NOFUZE BREAKERS ARE ON ACTIVE DUTY—

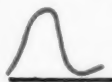
mobilized to protect war circuits



NOFUZE "DE-ION" BREAKERS



prevent *harmless* overloads from interrupting war production.



protect circuits from *dangerous* overloads and "shorts".



restore service *instantly* with just a flip of the switch.



Absent? Yes. Absent for the duration from peacetime applications because the Westinghouse production of Nofuze Breakers is devoted to war requirements.

But far-reaching improvements are resulting from this wholehearted participation. For example, in the new line of "F" Frame Breakers, all ratings from 15 to 100 amperes have been redesigned into one compact frame size. Instead of 14 different models, 4 now serve the same purpose.

In a typical panel, the new breaker results in a saving of 38% of the steel and 18% of the copper over present panels. And although the new breaker is smaller and weighs less than half of some of the superseded units, it has better performance.

Westinghouse engineering facilities have been placed on a broad consulting basis to help with the job of protecting vital war circuits from unnecessary interruptions. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pennsylvania.

J-60522

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

NOFUZE CIRCUIT PROTECTION

Electrical Contracting, March 1943

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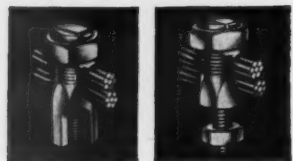
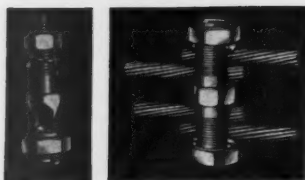
"All SIZES of SERVICE CONNECTORS—

from No. 10
to 1,000,000



and All TYPES"

You can find exactly the service connector you need, in the Penn-Union Catalog: Yoke-and-Nut type, in a complete range of sizes . . . Service Entrance connectors . . . Service Post and Special connectors in wide variety.



Also . . . the most complete line of Tee Connectors, Cable Taps . . . Straight, Parallel, Elbow and Cross Connectors . . . Bus Supports, Clamps, Spacers . . . Grounding Clamps, Terminal Lugs . . . practically every good type.

Leading utilities, industrials, electrical manufacturers and contractors have found that "Penn-Union" on a fitting is their best guarantee of Dependability. Write for the Penn-Union Catalog.

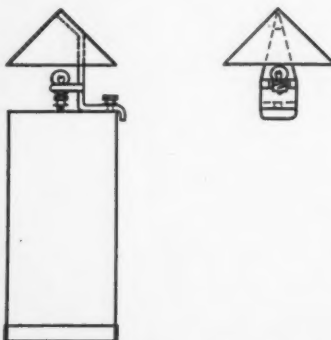
**PENN-UNION
ELECTRIC CORPORATION**
ERIE, PA. Sold by Leading Jobbers

PENN-UNION
Conductor Fittings

Methods

[FROM PAGE 42]

When the warning signal is given, certain men in each building are designated to distribute these markers at various points on each side of all aisles



AISLE MARKERS for blackouts in industrial plants to allow safety of movement within the buildings.

to enable those who have to move through the plant to do so with some degree of safety. Several tests have been made and the procedure has been found very successful.

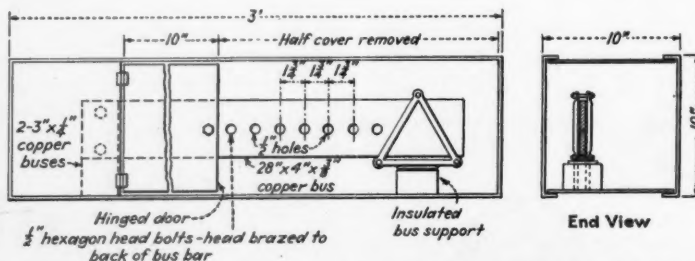
WELDING OUTLET BOX

WIRING

The use of electric welding in ship construction has been steadily increasing due to advanced construction methods and the pressure of emergency conditions.

To facilitate the use of electric welding at the newly constructed ways of an eastern shipyard, welding outlet boxes were spotted at strategic points along both sides of the ways, by the E. J. White Company, Newark, N. J., electrical contractors.

These outlets consisted of enclosed



ENCLOSED WELDING BUS is used as a terminal for welding cables in this shipyard. Outlets of this type are spotted on both sides of the ship ways to facilitate modern electric ship welding.

steel troughs, 36-in. long and 10-in. square. The troughs are fitted with a 28-inch length of 1/2-in. by 4-in. copper busbar, supported by an insulated A clamp on one end and the two 1/2-in. by 3-in. feeder buses at the other end. The 28-inch bus has a series of 1/2-in. holes drilled on 1 1/2-in. centers. Each hole is backed up by a 1/2-in. hexagon head nut brazed to the back of the bus. Hexagon head bolts are used to clamp the welding cables to the bus at these points. A hinged door provides access to the drilled copper bus.

KEEPING ELECTRICAL STARTERS OPERATING

INDUSTRIAL

A program of constant checks against oil, dirt and moisture has enabled one large manufacturer to run 6,500 electric motors for 10 years with only 10 minutes lost time due to power failures. Oil, dirt and moisture are saboteurs which ruin electric motor starters so important to plants depending on electric power to drive their machinery.

This particular plant adopted a vigilant maintenance program and immediately discovered that practically all its starters and other equipment needed attention. Since regular inspection and cleaning were started, there have been almost no shutdowns. Such programs are more important than ever before to keep the motors turning to meet the demands of war. Rest periods are short or may not occur at all. Machinery that lay idle for years has been pressed into service although it may not be in first-class condition.

Close cooperation with manufacturers by motor starter users may point the way to changes in design that will reduce the need for maintenance and prevent shutdown for repairs. Re-design and improvement of a few parts have been known to increase the useful life of a complete starter for a long time. No matter how good a design may be it can always be applied to some service or in some atmospheric conditions where its performance may not be entirely satisfactory.

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO

100% WAR PRODUCTION AT

CRESCENT

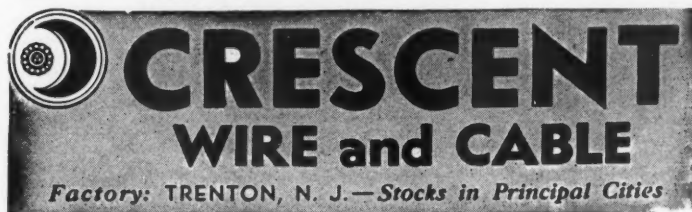
is Helping to Preserve the Light of Safety



Into practically every type of war equipment—airplanes, tanks, ships, trucks—goes insulated wire and cable. In many cases a part of this most necessary product was made at the CRESCENT Plant.

CRESCENT INSULATED WIRE & CABLE

ASK YOUR WHOLESALER FOR



CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER-PROOF WIRE

Electrical Contracting, March 1943

45

Just Published! To Help SPEED WAR WORK

Clip the coupon for your
copy of the NEW bulletin on
**BLACKHAWK
HYDRAULIC
EQUIPMENT**



FREE

Get the story on these amazing Porto-Power PIPE BENDERS

They have exclusive features that put money
in your pocket and rush projects way
ahead of schedule. And, with your man-
power and material problems — you'll
be glad to know that they're ONE-
MAN OPERATED and ACTUALLY
SAVE MATERIALS!



IF YOU ALREADY OWN A BLACKHAWK PIPE BENDER —

all the more reason to write for the new
Bulletin. We want you to have the bene-
fit of knowing all about the special at-
tachments which adapt your present
hydraulic unit to pulling drive pul-
leys, lifting heavy equipment into
place and doing scores of other
trouble jobs easily!



*Mail This
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BLACKHAWK MFG. CO.
Dept. P.2033, Milwaukee, Wisconsin
Rush your new Hydraulic
Equipment Bulletin V-43 to us.

Name.....
Company.....
Address.....
City and State.....

Methods

[FROM PAGE 44]

ELECTRIC RIVETING

INDUSTRIAL

A rivet bucking yoke perfected by
Perry Anderson of Fleetwings, Inc., has
simplified the art of riveting and made
it a one man's job. The yoke is used
for riveting in inaccessible places of

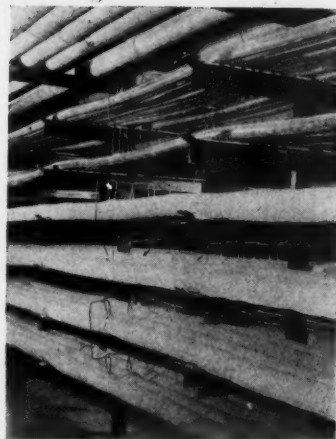


PERRY ANDERSON with his pet, the
rivet bucking yoke. It is particularly
adaptable for fastening rivets accurately
in difficult positions.

aircraft structures. With the tool, one
man can do the entire job.

Before the device was made up, it took
two men for the job; one as the riveter
and the other to back the rivet up when
it was plunged into the hole.

The riveter gun fits into the yoke
and the far end of the tool then is
placed in position for bucking, with the
bucking end automatically lined up with
the rivet.



CABLE SHEATH GROUNDING of
lead covered cables at the Buick Avia-
tion Engine Plant was accomplished by
looping and soldering a No. 6 stranded
bare copper conductor to all cables in
the "T" rack. The Associated Electric
Construction Company offset the loops
to provide good contact along the
cable length. Ground conductor was
tied into the ground bus system.

INCREASING LIGHT UTILIZATION

INDUSTRIAL

Colors, in painting, can be put to-
gether with stepped-up lighting to
materially increase light utilization and
efficiency. In painting production units
with properly contrasting colors for the
body of the machine and for the work-
ing area, it has been proven by actual
tests that accidents are reduced, there
is less eye fatigue to employees and
overall output is increased to a marked
degree.

Below is a chart of DuPont recom-
mendations presented as a result of
joint research with lighting experts of
the Philadelphia Electric Co. Many of
the suggestions produce a light utiliza-
tion twice what is now good general
practice. If white paint is used on a
floor it has a reflecting value of 85
percent.

	READ UP					
	I	II	III	IV	V	VI
CEILING→	WHITE 90%	WHITE 90%	WHITE 90%	WHITE 90%	WHITE 90%	WHITE 90%
WALL→	FRENCH GRAY 60%	IVORY 75%	IVORY 75%	WHITE 90%	DAYLIGHT GREEN 72%	LIGHT ROSE 76%
DADO→	LUMINOUS GREEN 68%	LUMINOUS GREEN 68%	FRENCH GRAY 61%	LIGHT BUFF 71%	LIGHT IVORY 76%	WHITE 86%
FLOOR→	SPRUCE STIPPLED ON WHITE 70%	SPRUCE STIPPLED ON WHITE 70%	SILVER GREEN 51%	SILVER GREEN 51%	NEUTRAL GRAY 46%	TAN 43%
	I	II	III	IV	V	VI

THESE FIGURES are the result of intensive research on the part of Du Pont
and Philadelphia Electric Company.

WESTINGHOUSE NEW DRY-TYPE TRANSFORMERS



36% copper saving... 50% steel saving... and a better transformer! That is the new Westinghouse Dry-type Distribution Transformer. (Ratings from 1 to 100 Kv-a.)

Three things make this transformer possible:

1. **HIPERSIL***: the new Westinghouse electrical steel that has one-third more flux-carrying capacity... saves copper and steel.
2. **CLASS B INSULATION**: permits more Kv-a output with less copper in the windings.
3. Westinghouse Engineering "KNOW-HOW" in pioneering and combining new developments into practical critical material-saving transformers.

The smallest and lightest indoor distribution transformer ever built, this new Westinghouse design adds to the inherent advantages of Dry-Type Transformers:

- **SPACE SAVING**... Mount a dry-type anywhere indoors... on a shelf, a post, or overhead.
- **TIMESAVER**... No fireproof vaults required.
- **IMPROVED VOLTAGE REGULATION and COPPER SAVING**... Located at the machine, the dry-type eliminates long heavy secondary runs.
- **NO LIQUIDS** to inspect, change or filter.

J-70399

Ask your Westinghouse Representative for full details on this lighter and smaller transformer. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

*Registered trade-mark, Westinghouse Electric & Manufacturing Company, for High PERmeability SILicon steel which carries 1/3 more flux.



Westinghouse

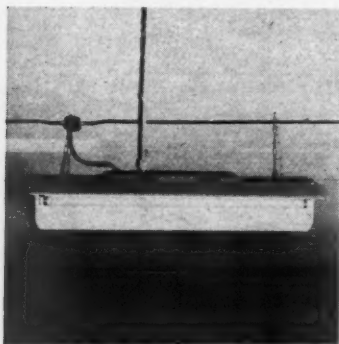
PLANTS IN 25 CITIES... OFFICES EVERYWHERE

DISTRIBUTION TRANSFORMERS

Modern Lighting

PAINT SUPPLEMENTS LIGHTING

The one main objective of ever increasing lighting levels has been to relieve the eye-strain of the man on the job and consequently enable him to be more productive. Brewster Aeronautical's chief plant engineer, H. K. Beebe,



TWO-POINT suspension is used to support the fixtures on 10-foot centers 11½ feet off the floor.

has gone one step farther than merely increasing the general illumination. He has painted the walls gray up to a height of 4 feet. The rest of the walls and the ceilings were painted a flat white with the exception of a four inch orange stripe which separates the white and gray. When an employee looks up from his work, the reflection of light from the orange stripe gives the eye an excitation which tends to soothe the tired muscles and relieve the eyestrain. This enables him to remain with his work for longer periods of time without the urge to look up and rest his eyes.

This painting, of course, has been only a supplement to increased illumination. The building, recently leased for expansion was completely rewired for fluorescent lighting. Threadless, thin-walled ½-inch conduit was used throughout. The fixtures, which are equipped for two-100 watt tubes, 265 volts and four-lamp ballasts, have been placed on 10-foot centers 11½ feet from the floor.

Light meters placed at bench height show 35 foot-candles which when supplemented by the unique paint job of white-gray-orange, give the employee maximum eye comfort, and a consequent increase in quality production.

UNDERGROUND LIGHTING

An article from the A.E.I. News of London and the *Magazine of Light* partially lifts the veil of official secrecy on the operation of underground factories in Britain.

In the very large quarry, ring mains are taken to the substations in each area, and then sub-mains feed the power and lighting distribution boards in adjacent shops and offices; in the smaller quarry, main cables were taken from the substation to the switch room which was built above the junction of four main galleries, and from this point ring sub-mains were taken to feed the lighting and power boards.

The lighting in two of these plants is being effected by the use of 80-watt 60-inch fluorescent lamps, with the exception of areas in the larger quarry which are devoted to canteens, washing rooms and similar enclosures, where to use the fluorescent lamps would be to waste a very important industrial tool.

The class of work being done demands a high intensity, and so, with due regard for economy, mainly concentrated general systems of lighting have been adopted, in which lighting units are grouped around the important working surfaces and other lighting fixtures are provided so that the installation complies with the statutory minimum in relatively unimportant areas. The Mazdalux F.135 open-top reflector, used in the large installation, is a dual-purpose feature which was specially designed for the quarry, and, while providing a high intensity on the important areas, allows the upward light from the lamp which was normally trapped in the reflector to reach the ceiling, from which it is diffused in all directions.

The necessary ballast is housed on a special strap fixed in the supporting chains, and this, together with a unique design of suspension, renders the erection of the equipment very simple and extremely quick.

The lighting fittings used in another factory are trough reflectors with the control gear mounted on the top.

Emergency lighting takes the form of units chosen from those which form the normal lighting, and these are wired on a special circuit which, by the use of a changeover switch, may be operated by a diesel set in the event of failure of the supply from the grid.

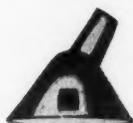


BENCH HEIGHT illumination of 35 foot-candles is provided by this installation plus an eye-easing white-gray-orange paint job.

Uncle Sam's War Needs Require Lighting Which Permits Maximum Production Every Hour... Every Day



RLM Silvered Bowl Diffuser



RLM Symmetrical Angle Reflector



RLM Deep Bowl Reflector



RLM Dome Reflector

• Skilled workers are at a premium. Through them and only through them can high standard production of vital war goods be maintained.

Since over 80 percent of human activity is governed through the sense of sight, the eyes of these war plant workers are industry's most important tools. Good light helps good eyes do more. It is even more helpful to the older skilled workmen, whose experience is so essential to efficient operation of every shift.

When making plans for lighting to meet the needs of today's high speed and multiple-shift operation, play safe by specifying lighting bearing the RLM LABEL. Adequate

lighting—directed for maximum efficiency and energy conservation—depends to a large degree upon the basic design and construction of the lighting equipment. When you purchase lighting units bearing the RLM LABEL you know that exacting laboratory and engineering tests have proved them highly efficient, economical to maintain at their original lighting efficiency, able to withstand vibration and heavy duty service, and uniform in quality.

Only Industrial Lighting Units built to exacting RLM Specifications and certified by Electrical Testing Laboratories are permitted to carry the RLM LABEL. Write for booklet, "The Meaning of the RLM LABEL," and Complete Set of RLM Specifications.

The Letters RLM Stand for Reflector and Lighting Equipment Manufacturers

RLM STANDARDS INSTITUTE

"SEE-ABILITY" saves critical



materials!



AMERICAN industry has been accustomed to an abundance of metals. A little waste was not serious.

Today the situation is different. We need to turn out finished products not only faster but with *less waste*.

Fortunately, much of the waste in manufacture can be avoided by applying the principles of good light. The "SEE-ABILITY" which good light provides makes for more accurate workmanship, permits greater care in check-ups and inspections, increases the speed of pro-

duction for our war effort.

Good lighting comes not only from properly installed equipment—but also from proper maintenance. A new book—"SEE-ABILITY FOR INDOOR EYES," published by Westinghouse describes many of the ways of getting more light from present equipment.

Westinghouse is sending this book to production men and business men who may be interested. For additional information, write Westinghouse, Lamp Division, Bloomfield, New Jersey.

The heart of good lighting is the lamp. To maintain lighting equipment at peak efficiency, recommend Westinghouse Mazda Lamps. They stay bright from end to end, have a longer life, and cost less today than ever before.

Westinghouse

★ MAZDA LAMPS ★

FOR GREATER "SEE-ABILITY"

now!

PERFECT CRANE PERFORMANCE WITHOUT PUTTING IN DC

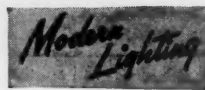
**New C-H Control
provides dynamic braking, full
range of stable lowering speeds,
accurate inching . . . all on AC**

Cutler-Hammer engineers have answered another long-standing problem of industrial America. Factories can now operate cranes on alternating current. No need for installing expensive generating equipment when direct current is not available. No costly, troublesome load brake for a makeshift lowering arrangement.

The new Cutler-Hammer AC Crane Control for the first time provides dynamic braking over a full range of 5 stable lowering speeds on alternating current operation. It provides accurate inching for spotting loads, setting slings, etc. Its response never varies . . . operators can trust it and save time.

You should insist on this outstanding engineering advance for your next crane. Write or wire today for full information. CUTLER-HAMMER, Inc., 1306 St. Paul Ave., Milwaukee, Wis. Associate: Canadian Cutler-Hammer, Ltd., Toronto, Ontario.

An ingenious control system solved the problem. Standard AC motor and this panel of standard Cutler-Hammer units do the entire job.



[FROM PAGE 48]

While steel conduit is used in some cases to house the conductors in the sub-circuits, by far the larger proportion of this wiring is carried out in cables supported on catenary wires, which are in turn stretched between steel bolts fitted to the ceiling; and in many cases these bolts are used for the suspension of the fittings themselves.

Mention must be made of the administrative offices and control rooms, where fluorescent lighting is used also, but frequently in specially designed fittings either in the form of flush ceiling panels or indirect fixtures, both of which applications have proved very successful.

NOT ENOUGH LIGHT FOR THE JOB

It takes time to see. Eyes do the job faster when the illumination is good. Less light slows them down. Moving objects are seen more clearly when proper levels of illumination are provided because the eye has quicker discerning ability. Thus accidents are often avoided. As the eyes grow older, psychological changes occur which impair vision; for example, the pupils of a 50-year old person admit slightly more than one-half as much light as those of a 20-year old person. In this and in other ways, higher levels of illumination serve to offset the handicap in seeing imposed by advancing age.



CLEANING WALLS AND CEILINGS

—One reason why the average footcandle level in service is considerably less than the initial value is that wall and ceiling surfaces which are freshly painted for a new lighting installation gradually darken and absorb more and more light. The accompanying photograph shows how effective the cleaning of these surfaces can be in helping to approach the initial lighting system efficiency.

WHICH LIGHTING HEADACHE IS YOURS?

**NEED MORE LIGHT,
BUT POWER LINES
ARE OVERLOADED**

**CAN'T GET
LUMINAIRES FOR
LOVE OR MONEY**

**REFLECTOR
MAINTENANCE
COSTING
TOO MUCH**

These Lighting Problems Now Solved!

CLARENCE BIRDSEYE, famous inventor of quick-frozen foods, has triumphed again! The latest product of his genius is a better kind of *lighting* for industry . . . revolutionary in its efficiency and economy.

Birdseye believed that lamp and luminaire should be ONE. In place of bulbs with separate fixtures, he visualized and created a lamp with *its own perfect reflector* sealed inside the bulb itself . . . precision-focused for accurate light control . . . requiring no fixtures or maintenance . . . providing scientific

illumination at the cost of bulbs alone. This is the Birdseye Reflector Lamp.

Users of Birdseye Reflector Lamps read like a "Who's Who" of American industry. Allis-Chalmers, Bliss & Laughlin, Curtiss-Wright, Delco-Remy, General Motors, Johns-Manville, Republic Steel, A. O. Smith, Vultee Aircraft, Willys-Overland—to name just a few—have adopted Birdseyes after exhaustive tests in use. Birdseyes may be the solution to *your* lighting problem. For full details write today for Booklet M3.

★ BIRDSEYE ★

WABASH APPLIANCE CORPORATION
345 Carroll Street, Brooklyn, New York
Manufacturers of Superlite Light Conditioning Bulbs and Wabash Superflash

BIRDSEYE Reflector Lamps

NO REFLECTORS NEEDED
Birdseye is a complete luminaire lighting unit in itself with its own reflector built into the bulb . . . the perfect, scientific combination of lamp and reflector.

DELIVERS MORE LIGHT PER WATT
Nothing yet designed equals Birdseyes for projecting light down to the working area, full force, without waste. Birdseye's perfect reflector and precision-focused filament do the job scientifically.

SAVES EXPENSIVE MAINTENANCE
Birdseye's pure silver reflector lining is sealed inside where dust, dirt, smoke can never reach it. Thus Birdseye reflectors never need cleaning. An important saving especially in high bay mounts.

SAVE HOURS OF WORK

ON DEFENSE JOBS WITH THESE GREENLEE TOOLS

★ ★ ★ ★ ★

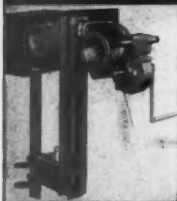
Cut labor costs and save vital hours on your defense jobs by turning to a better use of tools. Greenlee Tools are saving hundreds of contractors on defense jobs from 15 to 75% in time and labor costs by making the work easier and faster for the man on the job.

COMPLETE LINE OF BENDERS

For any bending job there's a Greenlee Bender. Small hand benders and powerful hydraulic benders for conduit, pipe and tubing from 1/4 to 4 1/2-inch size. Benders that are easily operated by one man, save the cost of many manufactured benders and fittings, are compactly built in one unit, and are easily carried to the job and set up.



No. 765 CABLE PULLER



This handy Greenlee Cable Puller clamps right on to the conduit through which cable is pulled, is easily carried to the job, can be set up in a jiffy, and is easy for one man to operate with one or two cranks and will save many hours of work when pulling in cable.

KNOCKOUT TOOLS

Enlarge holes without long tedious drilling, reaming and filing with Greenlee Knockout Punches and Cutters. This handy tool is inserted in a knockout or a small drilled hole and a smooth accurate hole can be quickly cut by turning the drive nut with an ordinary wrench.



HYDRAULIC PIPE PUSHERS

Greenlee Pushers eliminate digging long trenches, tearing up lawns, breaking through concrete, backfilling, and tamping when installing pipe underground. Only a short trench is required and one or two men can easily push the pipe by pumping the handles.

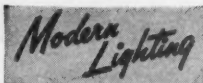


WRITE FOR FREE COPY CATALOG 33E

Find out how these and other Greenlee Tools for the Electrician, Carpenter, and Plumber can help speed up your jobs... write for Catalog 33E.

GREENLEE TOOL CO.

1749 COLUMBIA AVE.
ROCKFORD, ILL.



[FROM PAGE 52]

LIGHTING IN A DEFENSE TRAINING CENTER

Long experienced in preparing men for trades in government services, the Delehanty Institute in New York City is now contributing to the war effort by training recruits for industry. The Institute is developing the skill of student workers under a fluorescent system which emphasizes the relationship between eyesight and accuracy in production. The installation consists of open-end industrial reflectors each using two 40-watt fluorescent lamps and located



STUDENTS are taught precision operations under high quality illumination.

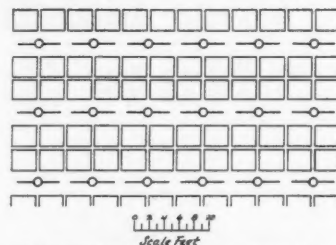
on about 8- by 8-foot centers. The illumination level is around 35 foot-candles.

Lighting A HOSIERY MILL *Fluorescent*

PROBLEM: To provide high-level, well-diffused illumination on a highly polished needle bar. The illumination must be both glareless and shadowless since the operator works with a yarn measuring less in diameter than a human hair. Failure to see a bent needle means production loss.

CONSTRUCTION DATA: The area lighted is 140 feet by 100 feet, with a 15-ft. ceiling, finished with a flat white paint. The working space is filled with single section, full-fashioned hosiery machinery.

SOLUTION OF PROBLEM: The general illumination is provided by individual RF luminaires each equipped with a single 85-watt RF industrial white lamp. The outlets are on 7-ft. 7-in. centers in the weave aisle and on 9-ft. 6-in. centers between the aisles. The mounting height is 8 feet.



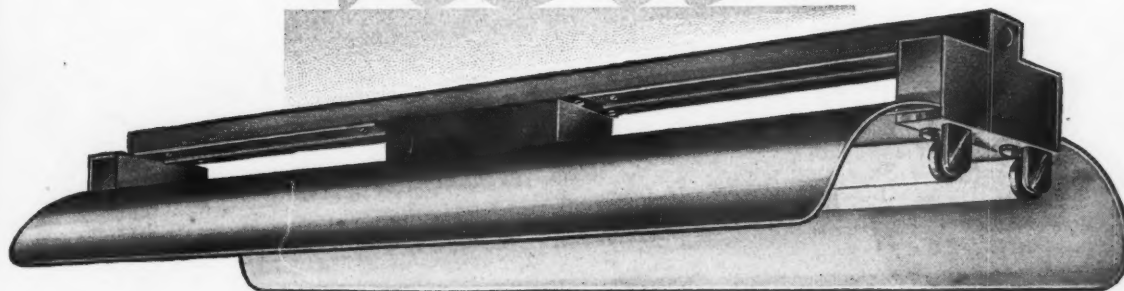
ILLUMINATION of 30 foot-candles is provided by this layout of machinery and fixtures.

RESULTS: The average general illumination in service provided is 30 foot-candles. Light is glareless and well distributed over the working area. Shadows are practically eliminated.



HIGH AVERAGE general illumination is the only solution to this hosiery mill application where a highly polished needle is the object of concentration.

WAR TIME



FLUORESCENT INDUSTRIAL

MEETS NEW THREE POUND STEEL LIMITATION ORDER

New in design—New in Principle—Precision built—Engineered to give the finest in lighting.

So unusual is this fixture that it can be surface-chain—or pipe mounted individually or in continuous runs with the greatest simplicity.

Entire wire way is of rigid metal construction and may be completely exposed for easy installation or maintenance. Reduces costs.

Ballast inverted under channel, is completely exposed for longer life and cooler operation.

Reflectors of Masonite are formed and finished in our plant, under controlled conditioning.

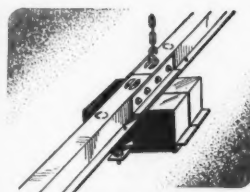
Louvres of Masonite, white enameled and may be added where shielding is desired.

Underwriters Laboratories Approved

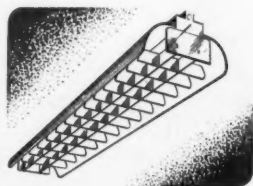
40 - A - SERIES for 2 - 40w, 3 - 40w, 4 - 40w, 2-100w, and 4-100w, fluorescent lamps.

WRITE TODAY FOR COMPLETE FACTS ON THIS NEW WAR TIME 40-A LIGHTING SERIES

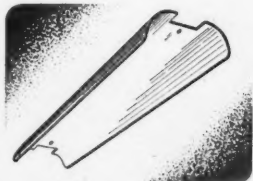
LIGHTING PRODUCTS, INC.
HIGHLAND PARK, ILLINOIS



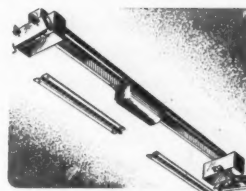
When Used in Continuous Runs—L bars are provided, making the entire run rigid... Remove socket covers and connect fixtures with nipple, which gives a complete wiring channel.



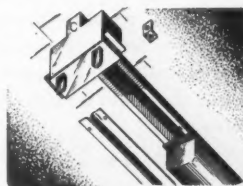
Where Lamp Shielding is Required—Louvers of masonite, finished in klasium white... May be added. Designed for proper light cut-off and are easily attachable.



Reflectors are of Masonite—Formed under controlled conditioning, in our own plant—which produces permanent shapes, and will not change under the most adverse humidity conditions... Finished in klasium white.



Note—Entire wiring channel may be exposed quickly—including lamp holder covers, without disturbing wiring assembly... Simplifies installation or maintenance and reduces costs



For Surface Mounting—Ballast is swung under channel, leaving top of fixture clear to flush on ceiling. Channel is easily accessible for ackerman... Screw or box mounting.



Conforms to new W.P.B. 3 pound steel limitations order... A 75% or better saving of strategic material so vitally needed for war effort.



Helping Plant Personnel TO SEE BETTER is an important part of our WAR TASK



How Good Lighting Helps Solve Many Manpower Problems

Leaving the day's work with the minimum of fatigue is an essential to sustained efficiency on the job. Especially is this important to those women employees who must leave their war jobs with sufficient energy reserve to carry on their homemaking tasks cheerfully and without endangering their health.

Good Lighting helps to make the job easier and less tiring because seeing requires time and energy. The better the light, the less the strain on the eyes and the less the drain on the energy reserve.①

Reduces Accidents

Fatigue, also, is the enemy of alertness against accidents. Improvements in lighting effect reductions in the accident rate.② For adequate lighting and the right kind of lighting system enables employees to see faster, more accurately and with less effort.

Better light... better seeing... extra energy... summarize the benefits of Good Lighting. These good lighting benefits have been demonstrated by sci-

entific research and laboratory tests and corroborated by the current experiences of industrial plants throughout the country engaged in war production.③

The right kind of lighting requires the selection of lighting units which will provide the proper amount, direction, diffusion and distribution of light and which will minimize glare.④

Free Lighting Guide

How to secure such lighting for your plant is outlined in the Benjamin guide "Specifications for Productive Lighting in War Plants." You may secure, without cost or obligation, a copy of this guide together with a copy of the new I.E.S. report "Value of Good Lighting in War Production." Write today to the Product Information Department H, Benjamin Electric Mfg. Company, Des Plaines, Illinois.

① See Booklet, "Value of Good Lighting in War Production" just issued by the Illuminating Engineering Society which contains laboratory findings and a cross section of industrial plant experience with lighting in war production. Also, booklet, "Plant Efficiency," published by the War Production Board.

② See "Safe Practices" Pamphlet, No. 22, National Safety Council.

③ For further data on this important subject, send for free copy of booklet "Benjamin Specifications for Productive Lighting in War Plants."



BENJAMIN PRODUCTS

INDUSTRIAL
LIGHTING EQUIPMENT
including fluorescent, incandescent and mercury lamp units

EXPLOSION-PROOF
UNITS

DUST-TIGHT UNITS
VAPOUR-TIGHT UNITS

FLOODLIGHTING
EQUIPMENT

MARINE LIGHTING
EQUIPMENT
MARINE WIRING
DEVICES

★
SOCKETS AND OTHER
WIRING DEVICES

★
SIGNAL EQUIPMENT
including Sirens, Horns, Banners and Telecode Relays

BENJAMIN

LIGHTING EQUIPMENT

Industrial Electrification

CAPACITY LOADS

UNDER the extraordinary conditions of a nation at war, the ordinary rules of applying motors have been revised. Conservative design, contributing to long and trouble-free life, is entirely appropriate when copper and steel are abundant. When, however, materials are critically scarce and long life is less important, the conventional service factors which offer a zone of safety between the nominal rating and the actual limits of physical and electrical capacity may be used. And that is what we are doing today under the new motor application ratings.

In most motor applications the chances are that the simple rule of calculating the horsepower required and taking the next size smaller motor will apply. However, it is important to keep in mind just what the rules mean and what they are intended to accomplish. In general, motors will run hotter, if on a similar application a conventional motor is operating at its top temperature rating. That means shorter life and more critical reaction to overloads.

The accompanying article gives the details of the methods of applying the new rules for several types of motors.

Previous articles covered—
Eliminating Causes of Severe Service Conditions

Providing Adequate Capacity for Increased Demand
Electrifying Operations to Reduce Unit Costs

Safety Protection for Electrical Operations

Increasing Flexibility of Electrical Service

Electrical Aids to Automatic Control

Electrical Ways to Reduce Waste How to Save Power

Protection Against Sabotage

Improving Working Conditions

Electrifying for Continuous Operation

Electrified Plant Housekeeping

Electrical Problems Under 168 Hour Schedules

Electrical Aids to Plant Conversion

Electrical Aids to Quality Control

Electrical Aids for Green Help

Codes in Wartime

Grounding for Safety

Air Raid Restoration

Operating Replacements

Preparing for Blackouts

Wiring for Quick Changes

Operating Under Conditions of Emergency Hazard

Future articles will discuss—
Welding in Industry
Salvaging Electrical Equipment

ENGINEERING • INSTALLATION • MAINTENANCE

Motor Practice Under War Rules

DURING the past year many important changes have been made in the method of selection and application of motor equipment. These changes have been necessitated by the need of saving strategic metals for primary war equipment. Only those new motor installations which are needed to make a direct contribution to the war effort should be made.

In order to make full use of the motors already installed and the new machines to be installed will require:

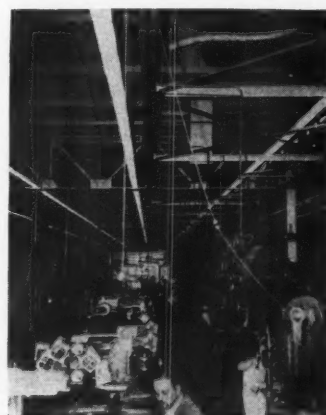
1. Elimination of the liberal reserve capacities in the application of new motor drives.

2. Use of standard open motors wherever possible to save critical war materials and the manhours required to build motors.

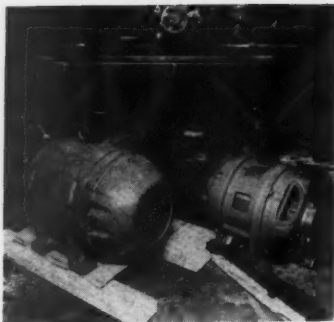
1. Elimination of the liberal reserve capacities in the application of new motor drives.

It is generally agreed that motors have been applied liberally in the past. Standard open 40 deg. C. continuous squirrel cage motors have a liberal overload capacity as shown by the 15 percent service factor that has prevailed. In addition, many users have selected a larger rating than required by their driven machine in order to have reserve capacity to provide for any possible overload condition that might occur and to assure a cool running motor with low maintenance cost. Although this is good practice when materials are plentiful, this practice must be modified in the interest of material conservation. This will permit more production out of the motors already in service and will permit building more motors from the limited quantities of raw materials allocated for new motor manufacture.

Another favorable factor that results in the equivalent of extra capacity is the method of rating motors. Most general purpose motors are equipped with Class A insulation. Class A insulation is made of organic materials such as cotton, paper, silk, synthetic varnishes, and similar materials. To assure long life without charring, it is considered good practice in motor design to limit its maximum temperature to 105 deg. C. This total temperature is based on 40 deg. C. ambient or room temperature; 40 deg. C. temperature rise for an open motor, 15 deg. C. for hotspots and 10 deg. C. to allow for the service factor. For totally enclosed motors, the temperature rise is 55 deg. C. with 10 deg. C. allowed for hotspots and no allowance for service factor.



High slip motors are engineered for punch press operations as shown. Installation is at a Republic Aviation plant. The flywheel attachment does most of the work hence there is no need for overmotoring.



OLD PRACTICE and new. For loads up to 6½ hp. use the 5 hp. open motor (right) instead of the 7½ totally enclosed fan-cooled motor and save approximately 175 lb. of critical materials. (Photo Westinghouse)

In many cases, motors are operated in an ambient temperature considerably below the 40 deg. C. (104 deg. F.) allowed in the rating. This provides additional reserve capacity which can be utilized to get more power out of motors.

The WPB has ruled that when buying new motors the following procedure be followed:

When applying open type a.c. continuous rated 40 deg. C. motors where the motor rated voltage is maintained and where the ambient temperature is usually below 40 deg. C. and will only occasionally or for short periods equal or exceed 40 deg. C., select an open motor with nameplate horsepower rating not more than 80 percent of actual load required by the driven machine. For example, use a 7½ hp. motor for a 9.38 hp. load instead of a 10 hp. motor.

When applying an a.c. or d.c. motor rated on a 50 deg. C. or 55 deg. C. basis such as splashproof, totally enclosed, fan cooled, or non-ventilated, or intermittent rated open motors, or enclosed motors, where the motor rated voltage is maintained and where the ambient temperature is usually substantially below 40 deg. C. select the standard hp. rating which is at least 91 percent of the hp. required to drive the driven machine as determined by test or calculation. For example, use a 20 hp., fan cooled, enclosed motor for a 22 hp. load instead of a 25 hp. motor.

When applying an open continuous rated 40 deg. C. d.c. motor in a location where the ambient temperature is usually substantially below 40 deg. C. and will only occasionally or for short periods equal or slightly exceed 40 deg. C., select the standard horsepower rating which is at least 87 percent of the horsepower required by the driven machine as determined by test or calculation. For example, use a 15 hp. motor for a 17.25 hp. load.

Where the application of any of the above formulae results in a rating which

is not a standard rating, the motor selected should be the next standard rating above the rating determined from the application of the formula.

It is agreed that in applying motors in accordance with the above recommendation where the ambient temperature approaches 40 deg. C. during a high percentage of the time and where the actual hp. demand is such that it utilizes nearly the entire percentage allowed in excess of the standard motor rating, that some reduction in motor life may be experienced, probably of the order from 20 to 10 years expected life.

Fully loaded motors operate at higher power factor thereby increasing the efficiency of the distribution system by reducing line losses.

In order to determine accurately the size of motor required for a machine, the load requirements should be determined as accurately as possible.

When a motor is to be applied, steps should be taken to determine the power required by the driven machine. This can usually be done by:

a. Testing a similar machine under duplicate load conditions. By measuring the watts input and knowing the efficiency of the motor. The horsepower required can be easily calculated.

$$Hp. = \frac{\text{Watts} \times \text{Efficiency}}{746}$$

b. Calculating the horsepower required when definite operating conditions are known. For example, a centrifugal or reciprocating pump when the capacity and load are known.

The tables show the recommended practice during the emergency in selecting the rating of motor of the open, fan cooled totally enclosed a.c. and also d.c. open types.

For new plants or extensions the supply voltage should not be less than 440 volts for motors, 100 hp., and smaller. For larger motors, 2200 volts can be used. This will result in appreciable savings of copper and other critical materials required for distribution systems and control equipment.

On existing distribution systems, voltage readings should be made and if the voltage is below normal, steps should be taken to increase it to normal or up to 10 percent above. Often this can be accomplished readily by changing the taps on the distribution transformer. Maintaining good voltage is extremely important on jobs that are hard to start such as drag conveyors, reciprocating pumps, etc., as it makes possible the correction of the relative starting and pullout torque when the motor is overloaded.

As long as the voltage remains constant a motor will develop the same starting and pullout torque regardless of whether it carries its rated load or

the increased load recommended in the tables.

For example, assume a 20 hp. open type squirrel cage motor having a starting torque of 1.5 times full load torque or equivalent to 30 hp. (1.5x20 hp.). When the load on the motor is increased to 25 hp. as recommended in Table I its equivalent starting torque at normal

voltage is $\frac{30}{25} = 1.2$. If this starting

torque is considered too low for the particular job in question, an increase of 10 percent in line voltage will result in

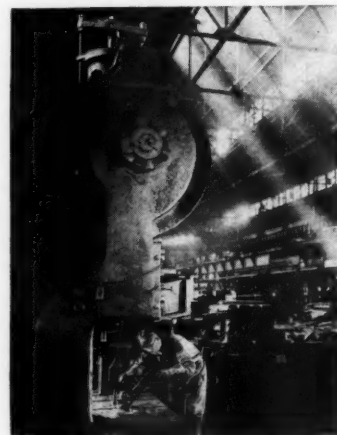
increasing the starting torque $\left(\frac{110}{100}\right)^2$

x 1.2 = 1.46 since torque varies as the square of the voltage.

Standard Open Motors

In order to save critical materials, standard open motors should be used wherever possible instead of fan cooled totally enclosed motors.

There are some applications such as foundries involving excessive dust conditions and refineries, dry cleaning establishments, etc., involving explosive hazards where fan cooled or explosion proof motors must be used. However, many users have standardized on fan-cooled motors for all their drives, even those where open motors could be used without materially increasing their maintenance costs or reducing the motor life expectancy. Open continuous duty motors are recommended for 25 percent overload capacity as compared to only 10 percent for enclosed motors. Table II shows the larger quantity of critical



RE-ALLOCATION of motors has resulted in startling efficiency and maintenance improvements. The shear was powered with a 50 hp. motor when tests showed a peak load of 36 hp. Changing to 40 hp. motor resulted in a power factor improvement of 12 percent. The shear is now making parts for the 30-ton M-4 tanks at a Pullman-Standard Car Mfg. plant.

TABLE I**Recommended Loading of Standard Open Squirrel Cage Motors, 1750 RPM**

For hp. Loads Up To	Use Motor of This hp. Rating	Instead of This hp. Rating	And Save Approx. This Many Pounds of Critical Metals*
1.25	1.0	1.5	36
1.88	1.5	2.0	14
2.50	2.0	3.0	4
3.75	3.0	5.0	19
6.25	5.0	7.5	63
9.38	7.5	10.0	80
12.5	10.0	15.0	36
18.75	15.0	20.0	31
25.0	20.0	25.0	106
31.25	25.0	30.0	176
37.50	30.0	40.0	186
50.0	40.0	50.0	94
62.5	50.0	60.0	320
75.0	60.0	75.0	120
93.75	75.0	100.0	110
125.0	100.0	125.0	550

*Although the above figures apply to one manufacturer's motors, the average savings shown are representative of standard open squirrel cage motors.

TABLE II**Comparison of Open and Totally Enclosed Fan Cooled AC Squirrel Cage Motors**

For hp. Loads Up To	Use Open Motor of This hp. Rating	Instead of This Totally Enclosed Fan-Cooled hp. Rating	And Save Approx. This Many Pounds of Critical Metals*
1.25	1.0	1.5	59
1.88	1.5	2.0	45
2.5	2.0	3.0	35
3.75	3.0	5.0	90
6.25	5.0	7.5	174
9.38	7.5	10.0	286
12.5	10.0	15.0	233
18.75	15.0	20.0	273
25.0	20.0	25.0	400
31.25	25.0	30.0	581
37.5	30.0	40.0	520
50.0	40.0	50.0	474
62.5	50.0	60.0	660
75.0	60.0	75.0	465
93.75	75.0	100.0	990
125.0	100.0	125.0	1080

*Although the above figures apply to one manufacturer's motors, the average savings shown are representative of standard open squirrel cage motors.

"WAR CONDITIONS"

MOTOR TABLES

GUIDE SHEET

TABLE III**Recommended Loading of Splashproof and Totally Enclosed Motors, 1750 RPM**

For hp. Loads Up to	Use Motor of This hp. Rating	Instead of This hp. Rating
1.1	1.0	1.5
1.65	1.5	2.0
2.2	2.0	3.0
3.3	3.0	5.0
5.5	5.0	7.5
8.25	7.5	10.0
11.0	10.0	15.0
16.5	15.0	20.0
22.0	20.0	25.0
27.5	25.0	30.0
33.0	30.0	40.0
44.0	40.0	50.0
55.0	50.0	60.0
66.0	60.0	75.0
82.5	75.0	100.0
110.0	100.0	125.0

TABLE IV**Effects of Voltage and Overloads on Starting Torques**

No. of Poles & RPM	Minimum Starting Torque Recommended by NEMA at Normal Voltage	Equivalent Starting Torque at 125% Rated Load	Equivalent Starting Torque at 110% Normal Voltage
2-3600	150%	120%	145%
4-1800	150%	120%	145%
6-1200	135%	108%	131%

Get the Most Out of ELECTRICAL EQUIPMENT

- .. by eliminating
OVERHEATING
- .. by quieting
NOISY MOTORS
- .. by preventing
NEEDLESS WASTE

TURN TO SUPERIOR BRUSHES!

For a given service, for each type of operating condition, and for each type of motor or generator, there is a grade of Superior Brush to satisfy the most rigid requirements.

The physical and electrical characteristics of Superior Brushes are determined by careful tests both in the laboratory and under actual operating conditions.

Standard methods of manufacture and laboratory control assure you that each lot of brushes will be consistently uniform.



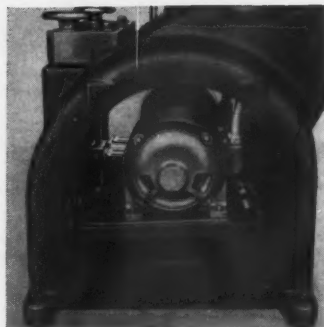
Prompt attention
given to all re-
quests for engi-
neering counsel.

**SUPERIOR
CARBON
PRODUCTS,
INC.**

9115 George Ave.,
Cleveland



"All that the
name implies"



Mounting the motor inside the base of machinery permits use of standard open motors in place of totally enclosed, fan cooled motors resulting in a savings of scarce materials. Photo The Hisey-Wolf Machine Co.

metals used in a fan cooled motor as compared to an open machine of equivalent hp. output.

It is estimated that at least 40 percent less man-hours are required to produce an open motor as compared to a totally enclosed fan-cooled machine. During this emergency, the labor capacity could be used to better advantage in increasing the output of standard open machines.

The higher the rated speed of a motor, the smaller the frame, therefore, motors of the highest standard speed permitted by the application should be used in order to save materials, save man hours and reduce the price to the user. According to WPB order L-221, motors 25 hp. and smaller for general purpose applications should not be less than 1800 RPM synchronous speed for 60 cycle circuits and corresponding speeds at other frequencies.

Direct current motors should be used only for those applications where adjustable speed operation is necessary such as metal cutting machines and testing machines or for those plants where d.c. power only is available. On some metal cutting machines two speed single winding a.c. motors can be substituted without reducing the quality or output of the tool. This substitution results in a large saving of copper and simpler and smaller control.

Control

Control equipment is similar to motors in that it has reserve capacity and can handle approximately the same increase in loads as motors without requiring larger sizes. It is obvious, however, that when the loads on motors are increased as recommended in the tables, the heaters in the overload relays must be increased proportionately to prevent tripping the motor off the line. Following are recommendations on heater sizes when motor loads are increased:
40 deg. C. Continuous duty open motors,
125 percent load.

Most of present heater application data tables are on basis of tripping at approximately 115 percent to 125 percent load and consequently the use of the next larger heater will permit the motor to carry approximately 125 percent load continuously.

50 deg. and 55 deg. Continuous duty a.c. or d.c. motors.

Use the heater listed for the rating involved.

40 deg. Continuous rated open d.c. motors.

Use the heater listed for the rating involved.

According to a recent WPB order, purchasers of integral hp. motors (except resale manufacturers under certain conditions) should use any idle or standby motor on hand or try to purchase suitable second-hand motors from at least three used motor dealers before ordering a new motor.

This gives the electrical contractor an opportunity to be of real service to his customer in helping him to select the best motor available for the job and also to properly apply it to assure maximum reliability in service and continuity of operation.

Due to the restrictions in buying new motors, many plants will find it necessary to relocate existing motor drives in order to take advantage of any reserve hp. available that will provide increased output from their machines. In many cases motors can be switched from partially loaded to overloaded machines to further increase the plant output.

By checking starter sizes and feeder wire sizes it often is possible to shift motors without costly changes in the feeder wiring system.

Whenever new motors are installed or changes made in the feeder distribution system of existing plants, it is recommended that means be provided to permit quickly checking the load on the motor from time to time. One inexpensive way to accomplish this is the installation of socket receptacle in the conduit line ahead of the motor to permit connection of portable meters.

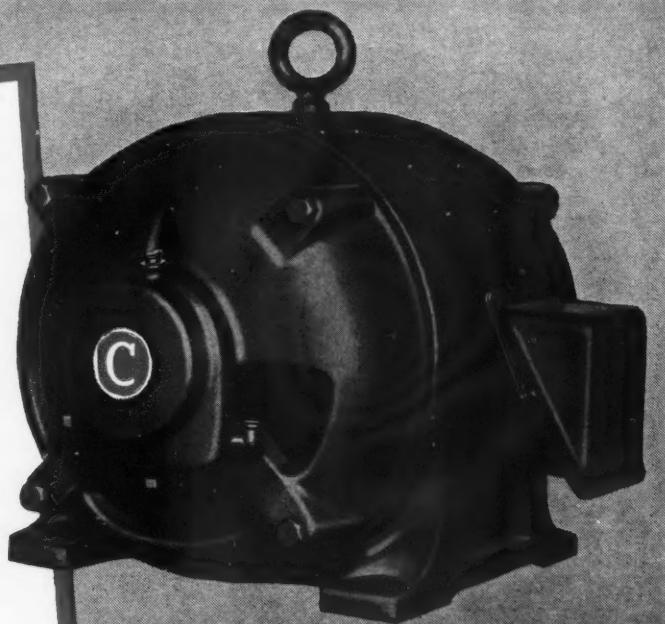
Many electrical contractors have service shops for reconditioning electrical motors and often sell used motors. Regulations permit a used motor to be sold for up to 85 percent of the new cost provided it has been thoroughly reconditioned and carries a new motor guarantee.

The modern repair shop is equipped to turn out these reconditioning jobs on short notice. New insulation, mechanical repairs, rewinding or other rebuilding makes the reconditioned motor a very reliable substitute for a new motor and most reliable shops will give their product the same test and guarantee as a new motor.

CENTURY FORM J MOTOR

Protection Against Falling Solids and Dripping Liquids

The top half of the motor is closed. Cooling air enters at both ends and is discharged below the shaft line.



The upper half of the Century Form J general purpose, open, continuous duty motor is closed to minimize the possibility of dripping liquids or falling solids entering the vital parts of the motor.

This added protection feature is made possible because of the scientifically designed Century mechanical ventilation system. All motors generate heat, so if the insulation is to have long life, the heat must be rapidly

carried away from the windings. Two powerful fans located behind each

bearing bracket draw cooling air "IN" through the bearing bracket openings. This cooling air is deflected first around the bearings to keep them cool and then across the windings and to air passages between the outer surfaces of the magnetic core and the frame—the heated air being finally discharged "OUT" through the openings located at the sides and bottom of the frame.

These modern, protected, industrial, general purpose motors meet the requirements of more than 80% of all polyphase motor applications. This Form J construction is at present available in 2 to 15 horsepower four-pole frame sizes.

Your Century Motor Specialist has full information and his wide experience may well prove valuable to you. We suggest you call him in today.



*Help You Beat
the Production
Promise*

CENTURY ELECTRIC CO., 1806 Pine St., St. Louis, Mo.

Offices and Stock Points in Principal Cities

*One of the Largest EXCLUSIVE Motor and Generator
Manufacturers in the World.*

"Shutdowns Ended at Hercules Foundries, Inc., After

Read This, IF YOU HAVE PRODUCTION TROUBLES

"About a year ago, Hercules Foundries Inc., 5950 S. Boyle Ave., Vernon, Calif., complained that frequent fuse blows were shutting down their ball mill and interfering with production.

"We investigated and found that the 50 ampere fuses they were using were the proper size to use—but they that blew on surges and momentary overloads.

"We figured that if the fuses had a longer time-lag they would be all right. 50 ampere BUSS Super-Lag fuses were then installed.

"They put an end to these shutdowns and Hercules Foundries haven't any more such production losses."

L. J. Meller,
Meller Electric Company,
Huntington Park, Calif.



BUSS

On This Ball Mill we Installed **BUSS FUSES**

Says Electrical Contractor L. J. Meller of Huntington Park, Calif.

THERE'S a profitable moral in Mr. Meller's experience at Hercules Foundries, Inc. It's another example of preventing interruption of production schedules by using Buss Super-Lag fuses. It's definite proof that fuse blowing on harmless overloads is unnecessary and need not be tolerated.

Buss fuses require no maintenance or periodic inspection. They don't open needlessly. If one opens, you can be sure some condition needs correction. When one opens, it requires less than 45 seconds to renew with an inexpensive link.

**Here is why BUSS fuses greatly
reduce or entirely prevent
needless blows**

The fuse case is designed to insure good contact on the link, even when the fuse is renewed by an inexperienced person—and it is so designed that vibration or heavy overloads or the constant heating and cooling of the fuse will not permit poor contact to develop.

Thus excessive heating which causes fuses to blow needlessly is prevented.

The fuse link used is the famous "BUSS Super-Lag." It has lag-plates attached to it. These give it a long time-lag so that unusually heavy starting current or other harmless overloads will not cause the fuse to blow.

How to solve the "shutdown problem"

Pass the word along that all purchase records dealing with circuit protective devices should be immediately changed to call for BUSS Super-Lag Renewable fuses. Then, as fuses are replaced or new installations made, your plant will automatically get the benefit of the carefree, trouble-proof protection that BUSS Super-Lag fuses afford.

BUSSMANN MFG. CO., University at Jefferson
St. Louis, Missouri Division McGraw Electric Company



Super-Lag FUSES

Reader's QUIZ

QUESTIONS from readers on problems of industrial equipment, installation, maintenance and repair. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published, we pay \$5.00.

DISTRIBUTION FACTOR

QUESTION 85. In a single phase motor with 24 slots in the stator, three coils per pole, one coil lying in slots one and seven with 29 turns, one coil in slots one and five with 53 turns, and one coil in slots one and three with 29 turns, what is the distribution factor or the effective turns?—C.F.B.

A. TO QUESTION 85. This is a four pole motor with 24/4 or 6 teeth per pole. Pitch of coil with throw 1-7 is 180 electrical degrees. Pitch of coil with throw 1-5 is 120 electrical degrees. Pitch of coil with throw 1-3 is 60 electrical degrees.

Assuming sinusoidal rotor flux, the coil distribution factor is

$$\text{cosine } \frac{\text{coil pitch in electrical degrees}}{2}$$

The winding distribution factor may then be figured as follows:

Coil No. 1 — 29 turns $\times \cos (180/2) =$
29 effective turns

Coil No. 2 — 53 turns $\times \cos (120/2) =$
45.9 effective turns

Coil No. 3 — 29 turns $\times \cos (60/2) =$
14.5 effective turns

Total turns—111

Total effective turns—89.4

Winding distribution factor =

$$\frac{\text{effective turns}}{\text{total turns}} = \frac{89.4}{111} = .805$$

G.I.S.

A. TO QUESTION 85. From the data given by C.F.B. it can be assumed that this is a four pole motor with 6 slots per pole, with slots No. 1, 7, 13 and 19 containing sides of two coils of 29 turns each, and with a vacant

slot at the center of each pole. A current band, extending from the center of one pole to the center of an adjacent pole consists of 29 conductors in the first slot, 53 conductors in the second slot, 58 conductors in the third slot (2 coils of 29 turns each), 53 conductors in the fourth slot, and 29 conductors in the fifth slot. The actual number of conductors per pole is $29 + 53 + 58 + 53 + 29$ or 222. Since there are 6 slots per pole, the phase difference between two adjacent slots is $180 \div 6$ or 30 electrical degrees. The effective number of turns per pole is equal to the vectorial sum of 29, 53, 58, 53 and 29 each differing from the preceding one by 30 degrees. By using the graphic method of solution the effective turns per pole were found to be 205. The distribution factor is equal to the effective turns divided by the actual turns or

$$205 \div 222 = .923 \text{ distribution factor.}$$

—J.K.H.

ARC SPOTLIGHT

QUESTION 86. What changes would have to be made to operate a 50 amp., 120 volt d.c. arc spotlight on 120 volt, 60 cycle current?—J.J.L.

A. TO QUESTION 86. In changing a 50 amp., 120 volt, d.c. arc spotlight to 120 volt, 60 cycle, a.c. current, it would be necessary to change the coil only from d.c. to a.c. using an a.c. coil of the proper voltage and current characteristics.—C.J.R.

A. TO QUESTION 86. You will get best results by getting a mo-

tor generator set. Remember that a.c. arc lamps give very poor lighting results when compared with d.c.—H.S.

ELECTRIC HOIST

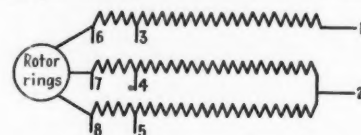
QUESTION 87. In a boat yard there is an electric hoist 440 volt, 20 hp., three phase slip ring motor with controller and grids, used for pulling boats up the ways. When the pulling cable is attached to the boat and the motor started, the boat hits the ways very hard and there is apparently no reduction of speed at the lowest point on controller until the boat is out of the water and climbing the ways. What is a remedy for this condition at not too much cost?—R.M.

A. TO QUESTION 87. The fact that the boat is being pulled through the water places a very light load on the slip ring motor and it tends to run at a higher speed on the slow speed step of the controller. The correct method of remedying this condition would be the addition of enough additional grid resistance to hold the speed at the desired point at light load.

If this is not feasible, a brake could be installed on the hoist giving enough drag to hold the speed down while the boat is in the water and the brake could be released when the boat started up the ways.—I.J.K.

A. TO QUESTION 87. We have experienced the same trouble on a bridge trolley drive, and it can be remedied very easily.

Use the following diagram, which is a standard connection for low starting torque drives, and connect No. 1 lead



to your first point on the controller, No. 2 lead to your second point, Nos. 3-4-5 and so on to your 3rd, 4th and 5th points, adapting your grids and my diagram to your controller.—L.A.H.

A. TO QUESTION 87. It would appear that there is not enough resistance in the secondary circuit of this 20 hp. motor. The change in speed that takes place as the boat ascends the ways is probably caused by an increase in resistance as the grids heat up. The solution to this problem, I believe, is to increase the resistance of the secondary circuit. The motor manufacturers should be able to supply the

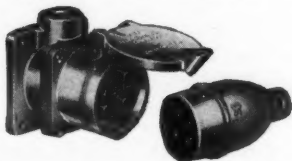
PROVED . .

ON THE TOUGH JOBS

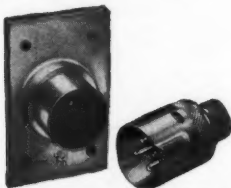
Pyle-National plug and receptacle equipment is built for heavy duty service, and is being used increasingly on the jobs where dependable service is of first importance. All types have full bakelite insulation, protected contacts and heavy steel or cast metal housings. There is a type and size for use with any portable electrical equipment.



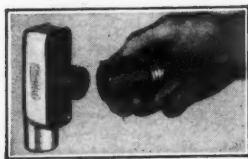
General Purpose plugs and receptacles: 1, 2, 3, 4, 5 poles, ratings 30, 60, 100, 200 amperes. Round prong contacts, rugged cast metal housings to withstand severe service.



QuelArc circuit breaking types: 2, 3, 4 wire types, ratings up to 200 amperes. Exceptional protection to contacts, for safe use as current rupturing devices.



Triploc and Multiple Circuit plugs and receptacles: 1, 2, 3, 4, 6, and 8 pole contact units, allowing assembly in combinations up to 32 poles. Manual and automatic release features. Ideal for portable tools, pyrometers, signal and control circuits.



Midget Triploc, compact, but with many exclusive heavy duty features for dependable service under severe conditions: 2, 3, 4 pole types.

Write for your copy of Pyle Catalog 1100 with complete listings of all types.

The Pyle-National Company
1344 N. Kostner Ave. Chicago, Illinois

necessary data regarding this, but if this is not available increasing the present resistance should produce the desired result.—L. H.

A. TO QUESTION 87. When a slip ring motor is controlled by resistance in the secondary, this resistance is generally of a value to give normal full load torque with all resistance cut in. In pulling a boat through water the drag will not be so great and, therefore, the excess torque will result in an increase in speed till the drag or retarding force is increased when the boat is pulled out of the water. A considerable increase in resistance might help but this would not be best. A better method would be to reduce the applied voltage by means of a reduced voltage compensator.

The use of a brake or an additional drag or load of some kind, such as an anchor or other device to drag in the water till the boat reaches the ways, would serve as a temporary remedy.

A set of speed reduction gears could be used, but this would be complicated and expensive.—J.E.W.

TRANSFORMERS

QUESTION 88. We are purchasing two 100 kva., transformers for 5500-volt, 2-phase to 240-volt, 3-phase service. We expect later to use these transformers plus an additional similar unit on a 4160-volt, 3-phase, 4-wire service. We have a choice regarding 3-phase primary connections. We can have two high-voltage coils rated 2750-volts with taps at 2400-volts for parallel operation on the 2400/4160-volt grounded neutral system. The other alternative is to have a 5500-volt winding with a tap at 4160-volts for future delta operation. The difference in price is very small. Which is to be generally recommended, the 2400 or the 4160-volt taps?—J.M.T.

A. TO QUESTION 88. Judging from your communication your present power supply is 2300-volt primary, but you anticipate a change in the near future, when your primary will be four wire, three phase, 4160 volts.

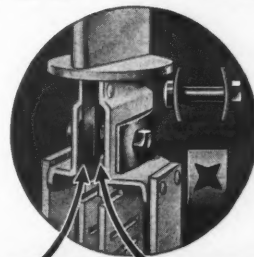
This would provide a splendid set up for the purchase of the 5500 volt transformers using the 4160-volt tap.

In all electrical industries, power plants and heavy users of electrical equipment, we find that most of their transformers are taxed to capacity, with the demand for more juice, becoming imminent.

A Cool Guard



WARE HI-LAG



LINKS LOCKED INTO CIRCUIT

NON-HEATING CONTACTS

Keep Motors Humming

- End Over-Heating
- Stop needless fuse blowing
- Time-Lag 2 to 5 Times Normal Current
- Certified to Comply—Federal Specification W F 803a-Type II

APPROVED BY UNDERWRITERS

WARE BROTHERS

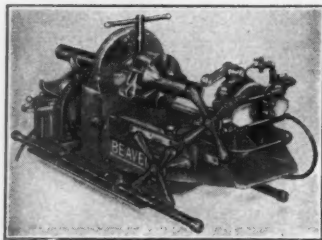
4410 W. Lake St.

Chicago, Ill.

WARE

Renewable

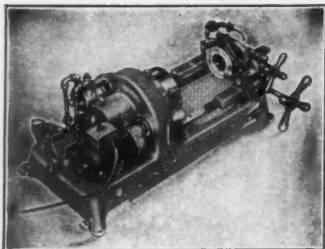
The A-B-C of . . . Pipe and Bolt Machines!



Beaver Model-A

A high-speed heavy-duty deluxe Pipe and Bolt Machine. Range $\frac{1}{8}$ to 2-inch-up to 12-inch with geared tools and drive shaft. Bolts, $\frac{1}{4}$ to 2-inch. Wt. 415 lbs.

Write for Bulletin A



Beaver Model-B

A light-weight utility Pipe and Bolt Machine combining many features of Model-A with the easy portability of Model-C. Range $\frac{1}{8}$ to 2-inch up to 8-inch with drive shaft and geared tools. Bolts up to $1\frac{1}{2}$ -inch. Weight 280 lbs.

Write for Bulletin B



Beaver Model-C

A STURDY LITTLE POWER UNIT Converts hand pipe tools into power tools from $\frac{1}{4}$ to 8-inch. Threads 8-inch in 6 minutes. Threads bolts up to $1\frac{1}{2}$ -inch. Two men can work at the same time without interference. Weight 150 lbs.

Write for Bulletin C

Write for new Tool and Machine Catalogue—Just off the press

BEAVER PIPE TOOLS

342 Deen Ave., Warren, O.

Reader's QUIZ

[FROM PAGE 65]

Granted you can juggle your voltage connections on the primary side especially with power banks, and a separate lighting transformer, but you won't have the zip with the lower voltage coil transformer that you will have with the 5500 volt coils.

In fact the tendency is to purchase transformers with taps up to 6900—13,800 volts.—W.H.L.

A. TO QUESTION 88. The choice entirely upon the secondary load. If the load is to be strictly a three phase balanced load then a delta primary and delta secondary may be used or a star primary and delta secondary may be used. A star-delta is to be preferred and would require the twin windings for 2750 volts with taps for 2400 volts.

On the other hand if the load is to be a lighting load, or unbalanced, and requiring a neutral, then the secondary should be star connected with a delta primary.

A star-star connection is unsatisfactory due to the disturbance of the third harmonic.

With a delta primary winding the 5500 volt winding with the 4160 volt tap would be required.—C.E.S.

A. TO QUESTION 88. The decision as to the best transformer design will depend partly upon the intended use. If you plan to use these transformers later where the distance is not too great, the more standard type would be one with the 2400 volt connection. With this you can have a 2400/4160 volt 3-phase, 4-wire primary system. Power transformers can be connected to the 3-line wires operating at 4160-volts and lighting transformers can be connected from any phase wire to the grounded neutral.

With the 4160-volt tap, a 3-phase 3 wire delta connection could be made, but these transformers would not be adapted to a 3-phase, 4-wire Y connection unless it is a 4160/7200 volt system. Present practice is to use 6900/11,940 or 7200/12,450 volt systems.

From this it seems that normally the 2400 volt tap transformers would fit in better.—J.E.W.

A. TO QUESTION 88. I recommend the future delta connection on the 3 phase line. Remember that it is possible to get 3 phase open delta on two units and still carry 57 percent

VARSLOT INSULATION

REDUCES BREAKDOWNS
DUE TO GROUNDS

★ Varslot Slot Insulation is a combination of 100% rag paper and black varnished cambric, cemented together. Varslot provides great mechanical strength as well as high dielectric strength. Varslot protects motors against breakdowns due to grounds, and is your customer's DEFENSE against machinery breakdown.

VARTEX VARNISHED CAMBRIC INSULATION provides unexcelled electrical protection against oils, moisture, acids, and alkalis. Multiple coats of insulating varnish baked on superior grades of fabrics produce high dielectric strength. Vartex Cambric Insulation also provides defense against motor breakdowns.

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Lock like a vise!
They eliminate:

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- Premature fuse blowings
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- Wasted current
- Night and holiday re-install KLIPOKLS everywhere.



WRITE FOR BULLETIN No. 6

TRICO FUSE MFG. CO., Milwaukee, Wis.
In Canada: IRVING SMITH LIMITED, Montreal

of full load. If you would be able to get on short notice a replacement in case of a burnout, then it would not be so bad, but the way market conditions are today, you would get into a very tight spot, unless you would insist that both leads of the 350 volt windings plus 2400 volt windings should be brought out. Then, by a bucking connection, you will be able to get 2050/2050 or 4100 volts for an open delta in case of a burnout on one unit. Of course, the primary must be insulated for at least 4160-volts—H.S.

RESISTANCE FOR A DISCHARGE RESISTOR

QUESTION 89. How can I determine the amount of resistance required for a discharge resistor on a 60 inch lift magnet used on 250 volts d.c. The ampere rating is not known. Would this resistor be just as effective if connected permanently across magnet winding or is it necessary to disconnect it every time magnet is energized? —J.J.L.

A. TO QUESTION 89. On a magnet described in the question there may be a considerable energy reaction when disconnecting it from the source of supply. This reaction is dependent upon the physical characteristics of the device as well as the manner in which it is disconnected. A sudden interruption will cause a greater reaction. However, slow interruption will have a serious effect on the switch.

There are several methods which could be used to dissipate the energy. Each one of these may conflict with one or more local conditions. Consequently, it is suggested that a most expedient and fairly effective method be employed. This consists of leaving a resistor permanently connected across the magnet. It may not prevent entirely the transient condition arising each time it is disconnected but it will provide a circulating path for the reactive energy.

The CM area of the resistor shall not be less than one-quarter of the CM area of the supply wire. The resistance may be proportioned so that at line voltage the drain will be approximately 10 percent of the line current. If a larger drain is permissible it will be more effective.—O.A.

A. TO QUESTION 89. A discharge resistor connected only when the field resistor is open, should have a resistor somewhat larger than that of the coil. This is equal to the ratio of the voltage to the current.

In order to prevent a possible breakdown of the insulation should a failure



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• In times like the present, some delays can't be avoided . . . but they can be shortened. When you need replacement bearings . . . and we are temporarily out of the type you require . . . we suggest you check our list of General Purpose Bronze Bearings. From our more than 800 sizes, you can, no doubt, select a size that can be easily altered to fit your needs. Oil grooves, slots or holes are easily, economically added. Every bearing is completely machined. Reasonably good stocks are on hand for delivery.

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The BRIEGEL METHOD saves you up to 50% on time and a substantial materials-saving (in keeping with today's thinking). Means more profit, too! Approved by Underwriters' Laboratory, of course.



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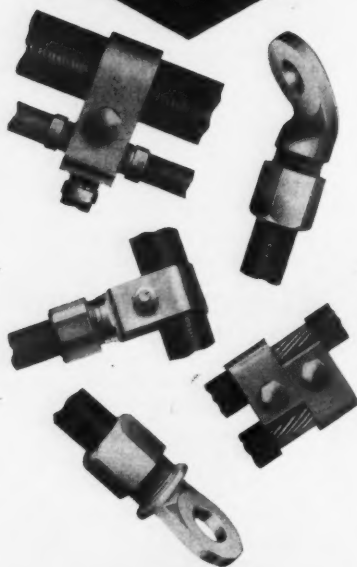
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There is a "Gorilla Grip" connector for every conductor wherever it taps or terminates.

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National Electric "Gorilla Grip" Electrical Connectors are precisely machined and fit snugly around each conductor. Easily installed without special tools. Stock sets made to meet your requirements. Complete information in new booklet "Mechanical Principles of Gorilla Grips."

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PRODUCTS CORPORATION
Pittsburgh, Pa.

Reader's QUIZ

[FROM PAGE 67]

of the power supply occur, it is advisable to use a permanently connected resistor of "thyrite" type which at normal voltage draws a negligible amount of current.—M.F.M.

A. TO QUESTION 89. The discharge resistance limits the induced transient voltage created by opening the circuit to the magnet. The maximum transient voltage is given by the equation:

$$E_t = E_s \frac{R_2}{R_1}$$

where E_t = the maximum transient voltage
 E_s = the line voltage (in this case 250 volts)

R_1 = resistance of the lifting magnet
 R_2 = resistance of the discharge resistor.

Assuming a maximum value of E_t as 1000 volts, R_2 would then be $1000/250 \times R_1$ or $4R_1$. If this discharge resistor is connected permanently across the magnet winding, there will be a power loss in it of one-quarter the magnet itself during the time the magnet is energized. This power loss may or may not be prohibitive, depending on operating conditions.—G.I.S.

Can You ANSWER these QUESTIONS?

QUESTION T3—We have a 125 kva. synchronous motor driving an air compressor. On several occasions the residual magnetism of the exciter has been reversed upon starting after being shut down for repairs. What would cause this? The machine rating is 125 kva., 2200 volts, 3 phase, 25 cycles, 250 r.p.m., exciter 125 volts, d.c. 40 amperes, 1150 r.p.m.—W.R.T.

QUESTION U3—When testing the insulation of an electric motor with an ohmmeter, what should be the minimum reading in ohms or megohms for the different voltages—110, 220, and 440 volts a.c. or 115 and 230 volts d.c.?—F.F.

QUESTION V3—We have a machine that requires a 2 hp. motor to take care of the load. Would it be practical to use two 1 hp., squirrel-cage induction motors with the same characteristics? The two 1 hp. motors are to drive the machine from the same shaft.—R.E.P.

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LEAD EXPANSION TYPE

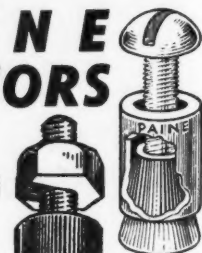


Fig. 910

Fig. 900

★ Simply place in hole, tap with setting tool and tighten.

★ Save time, effort and get permanent workman-like job.

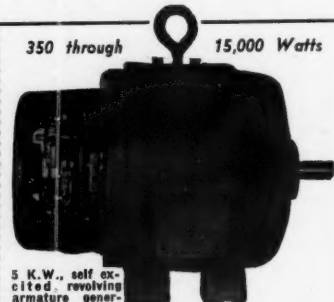
★ Precision threaded, rust and vibration resistant. Fig. 900 available in 9 different diameters 4-32 to 5/8". Fig. 910 in 1/4", 3/8", 1/2" diams. In standard lengths.

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We make a complete line of revolving armature generators—self-excited and separately excited models 1800 and 1200 r. p. m. Single or two bearing design for coupling drive or direct mounting. Standard voltages available: 110, 220, single phase, 2 or 3 wire, three phase or three phase four wire. Frequencies 25, 30, and 50 cycle. Voltage regulation about 8% between no load and full load with 3% speed change.

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"Don't Waste Critical Materials Save Copper, Steel, and Labor with these Combination Starters"



ALLEN-BRADLEY Combination Starters consist of a manually operated disconnect unit and a solenoid operated motor starter . . . all in one cabinet. Use them now to make the following vital savings:

SAVE MATERIALS

- Less copper to wire one unit.
- Less conduit, lock nuts, bushings, and fittings to hook up one box.
- Less steel—only one box which is much smaller than the separate disconnect switch and starter boxes.

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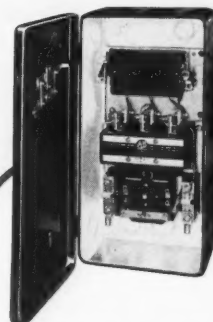
- Less time required to install one cabinet.
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- No maintenance. A-B patented silver alloy, double break contacts in both disconnect switch and starter need no dressing or cleaning. No pins, pivots, or bearings to cause trouble.

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Write for Bulletin 712.

BULLETIN 712 COMBINATION SOLENOID STARTER

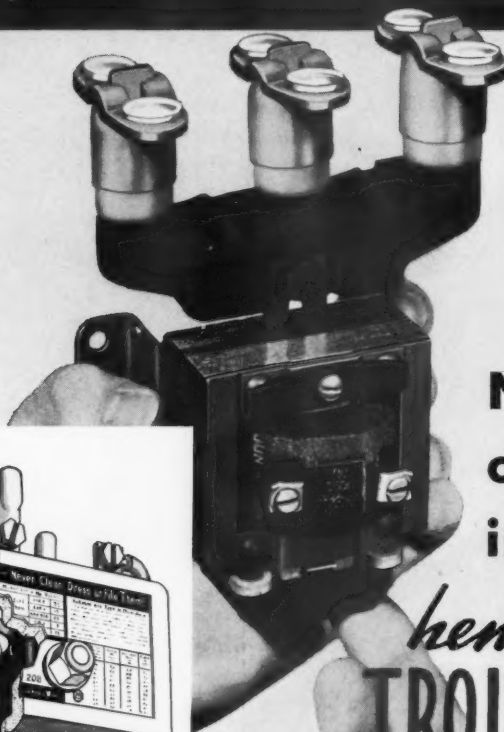
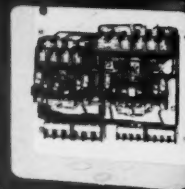
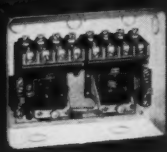


Allen-Bradley Bulletin 712 Combination Starters are available in a wide variety of enclosures.

ALLEN-BRADLEY

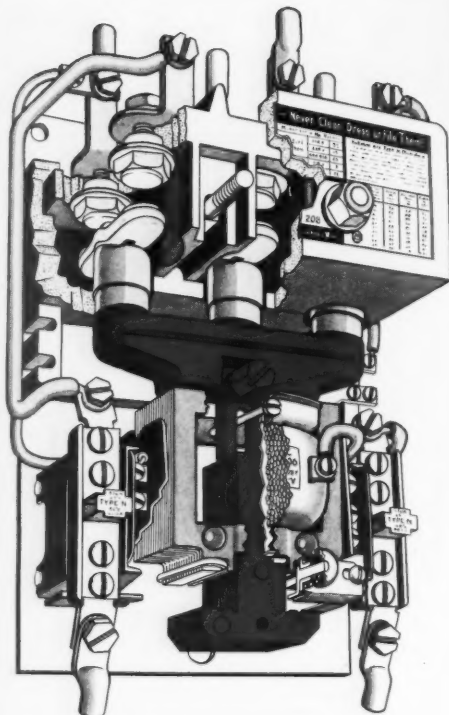
COMBINATION STARTERS

QUALITY



**No
other starter
is so simple**

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The only moving part ... the vertical solenoid plunger ... is shown in red. Arc hood is broken away to reveal contacts.

Allen-Bradley Solenoid Starters are surprisingly simple in design. They have only one moving part ... the plunger that opens and closes the double break contacts with a straight line vertical motion.

This simple construction does away with pivots, pins, bearings, hinges, flexible jumpers, and other trouble-breeders that can gum up, corrode, or stick.

To be completely trouble-free, a starter must not only be simple ... it must have double break contacts that can operate indefinitely without maintenance. A-B patented silver alloy contacts never need filing, dressing, or cleaning. You can install A-B Solenoid Starters ... and forget them. They are good for millions of trouble-free operations. These features explain why A-B starters are so popular in machine tool and industrial applications.

Allen-Bradley Company, 1307 S. First St., Milwaukee, Wis.



ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

QUALITY

Wartime Credits and Collections

[FROM PAGE 32]

requirements. There is another factor in the picture. Suppliers with curtailed inventories can be "choosy" in the selection of customers and quite naturally lean toward those with the cash or the ability to pay promptly so it behooves you to keep your financial condition as liquid as possible by getting your settlements on time. Tolerating delinquents these days is as foolhardy as price-cutting or chiseling on priorities.

Credit to War Industries

The hazard of financing war industries, strange as it seems, has also increased and this, of course, includes the granting of credit to this class of industrialist. Credit men and bankers point out that a concern may now take a single war order that exceeds a full year's normal pre-war business and be swamped into a precarious position by the abnormal stress upon production facilities. This situation has made it necessary for banks to study a concern's ability to fulfill its war contracts. The contractor, of course, has not the trained personnel to study the plants and equipment of prospective credit-seekers but he can avail himself of his banker's advice. Bankers are being invited to give the RFC pointers on the credit of prospective borrowers, and, in turn, the RFC offers the broader facilities of its experience gauging credit risks.

Inventories

Another thing to remember is that inventories, due to priorities and other restrictions, have lost their importance as a basis for bank credit and this has a bearing on the whole credit granting structure. Today, inventories must be kept to skeleton proportions because of difficulty of getting stocks and government regulations. So, accounts receivable now loom of primary importance, hence, when analyzing the financial statement of a prospective credit-seeker in the industrial or commercial field, consider receivables as of prime importance. See that notes receivable do not bulk too large in ratio to accounts receivable. This usually indicates that the creditor is taking notes in lieu of cash in payment of accounts. Quite a lot of this is being done today, apparently because creditors assume that money is so plentiful that the notes will be paid when due but the procedure is hazardous just the same. Unless abso-

lutely necessary, do not accept notes for your receivables and before asking for credit yourself, scrutinize your financial statement closely. If your receivables are loaded with delinquents, accounts long past due or relics of years gone by, your chances of getting credit are slim. Put the pressure on your old accounts NOW and collect all you can. The Fates favor the contractor who keeps his business in a high state of liquidity and who makes sure that prospective purchasers follow the same practice.

Finally, cast your eyes ahead to the postwar period. Many authorities contend that there will be deflation, that volume and prices will drop sharply. Should the boom deflate, it will be hard to collect and if you enter the postwar period with heavy accounts receivable, you may have to write off a substantial sum against profits or net worth and it is not likely that profits will be any too high during the war because taxes and price ceilings will cut deeply into earnings. Close attention to credits and collections from all angles will help you emerge from the war and postwar periods on a sound financial basis.

Mass Production of Coils

[FROM PAGE 37]

The girls are gradually trained in all the coil making operations so they can quickly be substituted in case of illness or other cause of absence. Operation of drill presses and other light machine shop equipment is another part of their training. Experience has proved that women operators possess a greater degree of dexterity and can withstand monotonous and repetitious operations much better than most men.

Every Bit Helps

What we are doing in our shop may seem a drop in the bucket when compared to large manufacturing operations. It is. But, if you get enough drops you will soon have a full bucket. When you consider that hundreds of similar shops throughout the country might do as much or more, it all adds up to a sizable quantity of subcontract production.

We may not make a big profit on this type of work. But, if it helps our all-out production program get materials to our boys overseas when they need it most, then the effort is more than worthwhile.

SAVES BRASS

FOR

3,800,000

30 CALIBER SHELLS



In eliminating brass from McGill Levolver No. 41-B Switch, enough critical material has been released to make 3,800,000 of .30-caliber shells. In place of the brass used a plastic casing has been developed with steel lever, nut and chain, making a sturdy unit, light in weight, easy to wire. Elimination of casing-cap facilitates assembly of switch. Ask for folder.

ELECTRICAL DIVISION

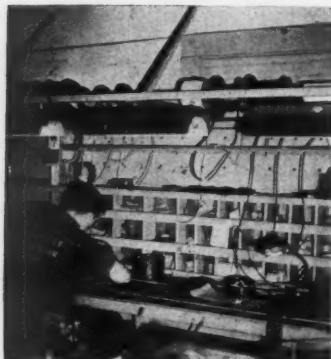
McGILL MANUFACTURING COMPANY, INC.
VALPARAISO, INDIANA

Motor Shops

SLEEVING RACK

The work bench in the winding department of the Tennessee Electric Motor Service shop at Nashville, Tenn., is equipped with an overhead spool rack for the various types and colors of insulated sleeving used in small motor repair work.

The horizontal rack covers the full length and width of the bench and also acts as a rigid support for the fluorescent fixtures over the work area.



WITHIN REACH of the mechanic, at any part of the work bench, are the insulated sleeving payout rack and fibre and accessory bins in this small motor winding department. Speedier rewinds, less lost time and profits result.

Numerous horizontal bars support freely rotating spools of vari-colored and sized insulating sleeving. The capacity of the rack depends upon the diameter and width of the individual spools.

An anti-tangle guide bar, through the holes of which the sleeving is threaded, keeps the loose ends from entangling and permits the mechanic to quickly and easily unwind any spool on the rack. The bar is made of a length of 1-in. by 2-in. wood and is mounted at an angle to prevent the ends of the sleeving from hugging the wall.

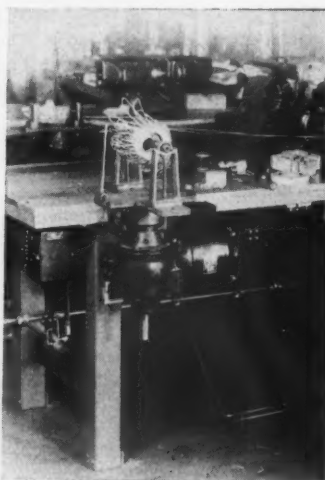
Three tiers of bins, under the rack are filled with pre-cut insulating paper, wedges and other accessories to speed the rewinding operations.

The winding machine, insulation cutter and creaser and the stock of magnet wire and insulating paper are near at hand to eliminate back-tracking and non-productive labor.

GEAR MOTOR ARMATURE WINDER

An efficient armature winding head, designed and built by the Mielke Electric Works, Inc., Duluth, Minn., has been added to their motor shop equipment. It consists of a cast metal cross mounted to a $\frac{1}{4}$ hp. direct current gear motor which is fastened to the edge of the workbench. Two vertical bent-shaped cradle supports with eyebolt and wing nut tightening devices slide back and forth in slots in the cross base to accommodate armatures from $\frac{1}{4}$ to $7\frac{1}{2}$ hp. in size.

The winding head rotates in a horizontal plane at speeds varying from 12 rpm. to 47 rpm., the actual speed being adjusted to winding conditions. Smooth,



ARMATURE WINDING is speeded up by this gear-motor winding head with variable-voltage speed control. Adjustable cradle supports can take armatures up to $7\frac{1}{2}$ hp. in size.

even operation is accomplished through variable voltage control from a motor-generator set mounted under the table. A foot treadle controls the motor speed—the speed increasing with increase in pressure on the treadle.

The same generator set operates, through a double throw switch arrangement, a smaller coil winding head mounted on the same workbench.

DEFUZZING COILS

Independent Electric Machinery Co., motor repair shop of Kansas City, Mo., has taken a page from the housewife's cook book and applied it to its coil making operations. Remember when the little woman used to hold the turkey or chicken over a gas flame to singe its pin feathers? Coils in this shop are now being subjected to the same treatment.

The object is to remove the lint and fuzz from the linen tape on the coils. Immediately after the coils are taped, they are wafted in front of a forced-air gas flame for a few seconds—just long enough to prevent scorching the tape. The conventional gas burner for burning out stators is used. The result is a defuzzed coil which retains its smoothness after impregnation and baking. It makes a much neater all around job and the coils slide into tight slots much more easily.

TRANSFORMER CLEANING TANK

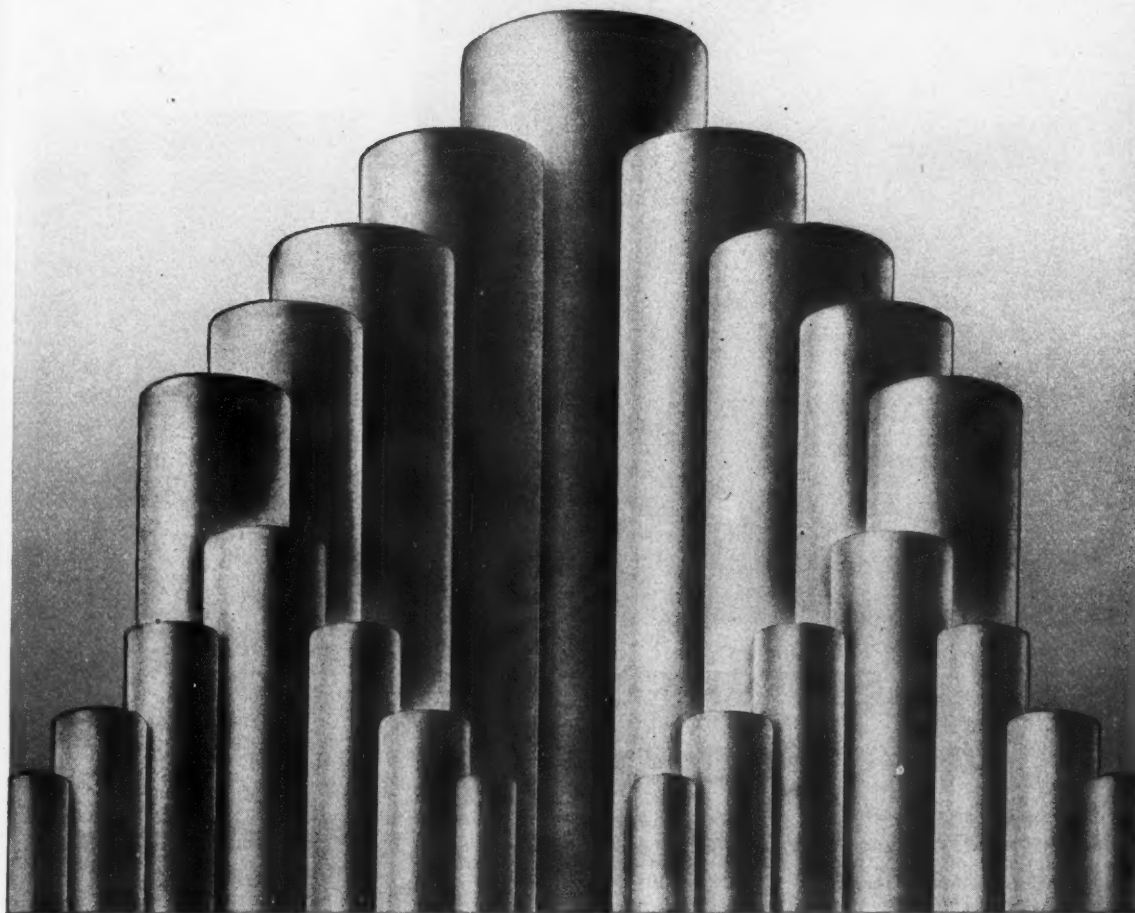
Burned out transformers that come into the shop of the Electrical Engineering and Construction Company, Des Moines, Iowa, frequently have cases that are corroded, rusted or covered with grease and other grime. These must be thoroughly cleaned and painted before the rewound unit is sent back.

To do the best cleaning job in the shortest possible time, Jack Pilmer has built a cleaning tank patterned after one designed by Arthur Turner of the Turner Armature Works in Jacksonville, Fla.

The inner steel tank is 36 inches in diameter and is about 46 inches high over all. A sheet metal shell encloses insulation surrounding the exterior of the steel tank. A sheet metal cover fits snugly over the top of the tank.

A cleaning solution similar to Oakite is preheated in a small gas-fired boiler at the right and circulated through the tank. For boiling the solution after the transformer case is immersed, a gas

In Tune with the Times



WALKER E. M. T. *Electric Metallic Tubing*

Now that steel is so precious—electrical contractors are turning to Walker E. M. T. (Electric Metallic Tubing) for their war-time installations.

Walker E. M. T. is available in three different finishes. One *completely sherardized*, inside and out; another with a *black enamel exterior* and a black enamel in-

terior, and a third with an *electro-galvanized exterior* and a black enamel interior. There are six sizes—from 1/2 inch to two inch, inclusive; all furnished in 10-foot lengths.

Investigate! Get in touch with the local Walker distributor or write us direct. Walker Brothers, Conshohocken, Pa.

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Manufacturers of: UNDERFLOOR DISTRIBUTION SYSTEMS; RIGID STEEL, FLEXIBLE AND TUBULAR CONDUITS; RUBBER, PAPER AND LEAD, AND SYNTHETIC WIRING AND CABLES; SERVICE ENTRANCE AND MAIN METALLIC CABLES



One sacrifice, he must not make—

SACRIFICES? We all gladly make them! But they're made in the interest of strengthening our war effort—not *weakening* it! No, there has been no restriction placed on porcelain enameled reflectors for industrial use. For they give you the best reflecting surface known. Uncle Sam knows it! Knows that tired eyes . . . head-

aches . . . nervousness . . . caused by inadequate or improper illumination, drain a worker's energy and slow his production.

Because eyes are the skilled workman's most valuable tool, Goodrich lighting specialists are devoting their full time and energies to increasing production through better illumination. They can help you.



Highlite



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Protecting vital plants with floodlighting—saving man-hours in production—Goodrich industrial fixtures are serving America's war effort everywhere.



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SOLD ONLY THROUGH ELECTRICAL WHOLESALERS

Motor Shops

[FROM PAGE 72]

burner is installed under the tank. Transformer enclosures are lowered into the cleansing bath by a chain hoist mounted

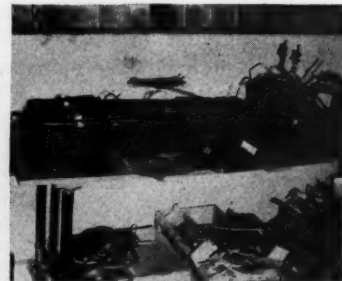


READY FOR BATH in a boiling cleansing solution, this transformer case will emerge from the tank shiny and clean. Solution is preheated in a gas-fired boiler. Burner under tank is for boiling the solution.

on a swinging arm. After being subjected to a down-to-bare-metal cleansing of this type, the transformer cases are removed, dried and painted.

COPPER RECLAIMED

If a source of the desired size of copper wire existed which required no copper priorities and entailed no long deliveries, a "copper rush" would probably occur on a scale as to somewhat equal the California gold rush of '49. Yet necessity, from copper scarcity, has brought about just such a source. It has been made economically possible by a process developed by Walter Everson, president, Everson Electric Com-



CHARRED FIELD coils which are to be unwound, cleaned, reinsulated, and rewound to the original specifications.

Electrical Contracting, March 1943

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Power Center Unit with
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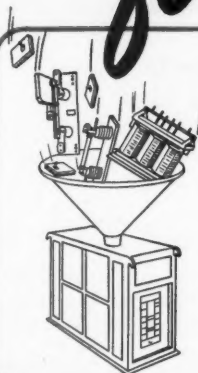
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for action*

THE DAY IT ARRIVES!

**TO SUPPLY POWER WHERE
YOU NEED IT—IN A HURRY!**

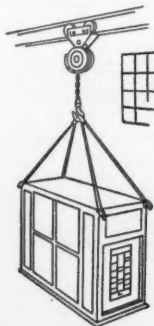
WE DO THIS:

- Build into one "package" all you need. This includes transformer, disconnect switches, potheads, fuses, and feeder breakers—all co-ordinated for maximum efficiency.
- Complete all wiring inside Power Center.
- Test Power Center to do your job.
- Ship to you as one unit.



**ALL YOU DO IS
THIS...**

- Install Power Center as a unit ... even above working areas to save floor space.
- Connect terminals to high-voltage source and low-voltage feeders. Power Center is ready for operation.



* Registered trade-mark, Westinghouse Electric & Manufacturing Company, for High PERmeability SILicon steel which carries $\frac{1}{2}$ more flux.

One order—one shipment—one piece instead of 43—and the Westinghouse Power Center—a transformer substation *complete* in one "Packaged" unit—is ready to go to work!

Install Power Centers immediately after arrival—quickly. They arrive complete, ready to connect. No waiting for missing parts—no time out to build vaults.

Besides saving time in making power available where you need it, Power Centers save Critical Materials. They eliminate long secondary cable runs because they can be installed at load centers. Hipersil* cores reduce size and weight.

Take advantage of the 56 years of transformer "know-how" in Westinghouse Power Centers. Call your Westinghouse Office or write Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-70401

Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE



POWER CENTERS



TIME-SAVING FEATURES OF J-M TRANSITE DUCTS--NO. 3

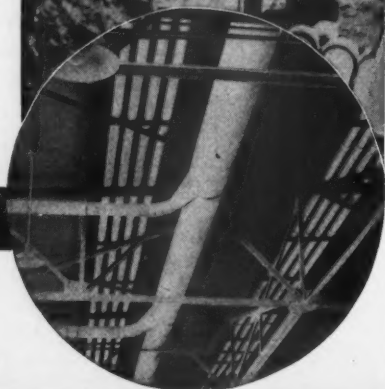
LONG LENGTHS!

FEWER sections, fewer joints, fewer spacers are required when you use Transite Ducts, because they are supplied in long lengths. These features, combined with Transite's light weight and easily-assembled couplings, make installation rapid and economical.

Transite Ducts are made of asbestos and cement, incombustible, rotproof, highly corrosion-resistant. They help keep maintenance costs permanently low.

For details, write for brochure DS-410. Johns-Manville, 22 East 40th Street, New York, N. Y.

INSTALLATIONS such as this are quickly finished, for Transite Ducts are easily handled and assembled. Harrington Couplings eliminate screwing or threading ... go together quickly ... drive up tight.



Johns-Manville TRANSITE DUCTS

TRANSITE CONDUIT ... for exposed work and for installation underground without concrete encasement.

TRANSITE KORDUCT ... for installation in concrete. Thinner-walled, lower-priced, otherwise identical with Transite Conduit.

Motor Shops

[FROM PAGE 74]

pany, Allentown, Pa. The machine which he has built from the ground up will reprocess and repair any motor field coil, using round or square wire No. 6 gauge or larger, reinsulating and using the original wire.

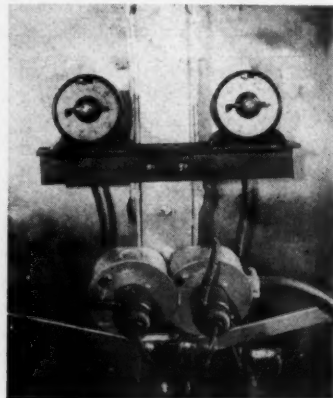
It unwinds the coil, cleans the wire, reinsulates it by wrapping with cotton, glass or asbestos tape depending on the class of insulation required, and rewinds the coil. For edge-wound coils, strip copper, etc., the method is the same except carried one step further to vacuum impregnation, if desired. The resulting reprocessed coil is given all standard and specified tests and in many cases can be rewound to closer specifications, as far as voltage tests, etc. are concerned, than the original, thus giving a better coil and one that carries the guarantee of an identical new coil.

Since uncertainty and long deliveries are entailed in the use of new copper, Walter has built himself up a nice volume of business in this new copper reclamation.

AUTOMATIC CONTROL FOR INFRA-RED OVEN

A drum shaped infra-red baking oven for small motor work in the motor repair shop of the Willey-Wray Electric Co., Cincinnati, Ohio, is equipped with automatic control for various baking periods.

The oven proper consists of a sheet steel cylinder, 30-inches in diameter, 17 inches deep and equipped with asbes-



TIME CLOCKS, mounted to the lamp socket ring, control reflector type infra-red lamps. One clock operates four lamps; the other, five. Clocks can be set for 15-minute intervals, up to five hours.

Electrical Contracting, March 1943

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Θ...little known enemy of fighter planes

AS ELECTRICAL ENGINEERS know, the Greek letter theta, Θ , often stands for relative humidity.

Whenever Θ is high, it's bad news for the electrical wiring and cable on fighter planes. For moisture in the air could so foul up the electrical system that it could prevent a quick take-off from an advanced camouflaged base like that pictured in the illustration.

The untiring efforts of the electrical industry, however, have licked this moisture problem.

Electrical design engineers put many kinds of materials and impregnants to exhaustive tests in their search for the proper insulation with high moisture resistance.

And they hit the right combi-

nation in the newest, most improved impregnants and Fibreglas.*

Fibreglas Electrical Insulations are all glass. Glass, being inorganic, does not absorb moisture. These insulations are therefore highly resistant to moisture. *In addition, they are highly resistant to heat . . . unaffected by most acids . . . possess high dielectric strength when combined with the proper impregnants.*

Miles and miles of power and lighting cable aboard many types of planes are Fibreglas-insulated. Approximately 85% of radio hookup wire for transmitters and receiving sets in aircraft is Fibreglas-insulated.

These facts are a measure of the successful use of Fibreglas by the electrical industry.

Besides, there are other huge and ever growing wartime demands for Fibreglas-insulated motors and generators in the Army and Navy Air Forces. Vast quantities of Fibreglas also go into other electrical equipment needed on warships and in the mechanized units of the Army.

Our production was tremendously increased this last year. Right now, it is constantly expanding month by month. YET—vital Army and Navy needs have so far kept pace with this expansion. These are the reasons why your electrical distributor has not always been able to fill orders promptly.

• • •

Owens-Corning Fibreglas Corporation, Toledo, Ohio. In Canada, Fibreglas Canada, Ltd., Oshawa, Ontario.




FIBERGLAS* ELECTRICAL INSULATIONS

*U. S. Pat. Reg. M. T.

ENGINEERED—
CONTROLLED INDUSTRIAL LIGHTING

SAVES STEEL

QUICKLY
INSTALLED



PERMAFLECTOR INDUSTRIAL UNIT
NO: 1-505N

For 500 Watt Incandescent or 400 Watt (Type H-I) Mercury Lamp

Better Lighting • More Lighting per watt over a longer period of time • **Flexibility of Installation • Low First Cost • Minimum Maintenance**—these plus factors, proved by years of service in hundreds of installations, establish **Permaflectors** as preferred equipment for industrial lighting.

PERMAFLECTOR Silvered Glass Reflectors


Put Light Where You Need It---Want It

Permaflectors are "Shaped Mirrors," that pick up the maximum flux of light and put it where you want it. Over 70 designs provide engineered light control---for concentrated, intermediate or broad distribution.

PROMPT DELIVERY!

Use GLASS, save Steel! Specify **PERMAFLECTORS**. Easily, quickly installed in new plants or old without interfering with work flow. Government-specified, Government approved!

**PITTSBURGH
REFLECTOR CO.**



402 OLIVER BLDG. - PITTSBURGH, PA.

Tear Off

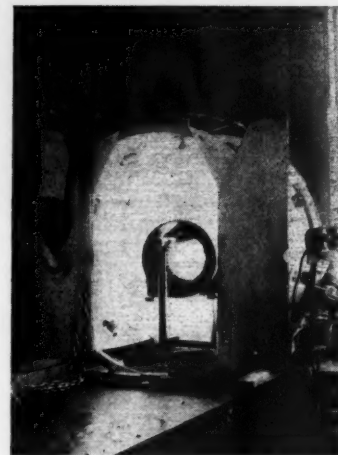
Clip to letterhead.
Sign. Mail for
complete information.
EC-3-43

Motor Shops

[FROM PAGE 76]

tos board doors and back. A steel hoop, supported by flat iron brackets circles the outside of the drum and serves as a base for mounting the sockets for reflector type infra-red lamps. Holes cut in the steel drum permit the lamps to be inserted in their sockets from the oven interior. Circuit wiring to the lamp sockets follows the encircling steel hoop.

There are a total of nine lamps in the oven wired to two time-clock controlled circuits. Five are connected to one clock, four to the other. The manual set time clocks, mounted on an angle iron bracket fastened to the socket support, are graduated in 15-minute intervals—up to 5 hours. This permits unusual flexibility of oven temperatures since either four, five or nine lamps



DRUM OVEN equipped with automatically controlled infra-red lamps is used for baking stators and armatures in the small motor repair department of this shop.

may be used depending on the size or the work and the length of the baking period. It also permits the use of only half of the lamps to preheat the work before actual baking takes place.

The following table of baking and preheat periods based on the size of the work placed in the oven is used as a guide to setting the time clocks.

Work dia. inches	Preheat all lamps minutes	Heat all lamps minutes	Baking time of lamps minutes	No. of lamps used
6	5	5	50	4
10	13	13	60	4
14	20	20	60	5

The work is suspended from a cross bar on two uprights fastened to a small caster-mounted truck which can be rolled into and out of the oven. A chain hoist on a swinging arm is used to handle the work.

PLUG IN "HOT"

... with Safety!

This man is working less than six inches from "hot" busses carrying 440 volts. Yet he makes his "tap" for a new machine in perfect safety.

The moment the plug is placed against the Bus Duct casing, it is grounded. As the projecting "fingers" are pushed through the plug-in opening they automatically clamp over the "live" bus bars within—and the connection is complete. At no time can the workman touch current-carrying parts.

Many hundreds of new branch circuits must be hooked up in the nation's war plants every day—and hooked up quickly. Where a safe, enclosed bus duct system is used, the job can be done without jeopardizing the lives of skilled workmen or halting production.

Bus Duct protects against fire and sabotage. It requires little or no maintenance. And in Bulldog's Victory Model, it conserves the greatest amount of critical materials consistent with sound engineering.

BUY MORE WAR BONDS • SALVAGE ALL SCRAP METAL

Send for descriptive
Bulletin No. 427

BULLDOG
ELECTRIC PRODUCTS CO.

Detroit, Michigan

Bulldog Electric Products of
Canada, Ltd., Toronto, Ontario

Field Engineering Offices
in All Principal Cities



MANUFACTURERS OF Vacu-Break Safety Switches,
SaffoFuse Panelboards, Circuit Master Breakers, Switch-
boards, Bus Duct Systems—FOR LIGHT AND POWER

Electrical Contracting, March 1943



Questions ON THE Code

Answered by
F. N. M. SQUIRES

Chief Inspector New York Board of Fire Underwriters

Grounding the Neutral

Q. "I am running a feeder from the service to a metal distribution cabinet located in the center of a factory. The wires are in conduit and are rubber covered with the exception of the neutral which is slow burning weather proof (SBW). Can I ground this neutral to the distribution cabinet?"—F.G.

A. No, the neutral must not be grounded in this case to the metal of the distribution cabinet nor grounded at any point within the building except at the service equipment. Official Interpretation No. 212 verifies this.

Priorities for the Purchase of Fuses

Q. "I ordered some fuse plugs and fuse renewals for N.E.C. fuses, the other day, from the Supply Company and they replied that they could not fill the order without an A-10 or higher, priority.

As I have no priority and do not know how I can get one, I could not get the fuses.

I think this is a most serious situation, as without fuses how can we protect the circuits in a house? Many people will resort to the old trick of putting a penny in back of the fuse as they must get light. This in turn will increase the fire hazard and unless I miss my guess, will result in a lot of fires.

A fuse is the most important part of an electrical installation and should not, by any means, be put on a priority basis. What do you think?—G.G.

A. Fuses certainly are protective devices and are recognized as such by the War Production Board and may be purchased by the users, that is,

the electrical contractors and the public without priorities.

While the W.P.B. requires that fuse manufacturers secure priorities of A-1-J, or better, from the wholesalers, they also require that the wholesalers distribute fuses to electrical contractors or to the general public without priorities.

The W.P.B. recognizes that fuses are vital and a necessity for the protection of property, material and life and therefore desires that no obstacle be placed in the way of the public in securing the necessary fuses.

Wires in Multiple

Q. "I recently ran two wires in parallel as a single conductor and carefully sweated solder lugs on these wires but the inspector put a violation on my work. Was this a violation?"—D.O.C.



CHIEF ELECTRICIAN Paul L. Ritter has charge of electrical maintenance at the Indianapolis plant of the Bridgeport Brass Company, now engaged in vital war production.

A. Yes. Section 3008 of the Code states that wires may be placed in a multiple only by special permission. Had you asked for this special permission the inspector would then have advised you that an interim amendment had been approved which stipulates certain requirements covering this. Interim Amendment No. 39 states that "Conductors in sizes 1/0 to 500,000 c.m. inclusive, may be run in multiple provided they are of the same length, have the same circular-mil area and type of insulation and as few conductors as possible for the type of insulation are used" and "where conductors are run in multiple, they shall terminate at both ends in *pressure connectors* so arranged as to insure equal division of the total current between all conductors that are involved." Where this has been done, special permission is not required but when all of these provisions are not complied with, special permission must be secured, except as permitted in Section 6205.

Lights in Paint Spray Booth

Q. "I have a job to install a light in a paint spray booth but cannot get an explosion proof fixture on the market at the present time. Can I use a 'vapor proof' fixture for this?"—J.J.M.

A. No. Section 5024 of the National Electrical Code states very decidedly that "no motor, lamp, or lighting fixture shall be located within spray booths" nor may they be located where there is any possibility of the spray lodging on them.

Two methods of lighting objects within spray booths have been followed: first, lighting fixtures of the flood or spot light type located at least ten feet from the opening of the booth and of the vapor proof type, have been judged suitable when adequate ventilation has been provided, and, second, a section of the booth wall is cut away and a piece of heavy plate glass, tightly fitting the opening, is set in and then a vapor proof fixture placed outside of the plate glass. The suction from the exhaust of the forced ventilation of the booth, keeps the vapors out of the fixture.

Determining Size of Service Switch

Q. "I understand that there is some new rule by which the service switch may be smaller than previously required. What is the new ruling?"—C.B.

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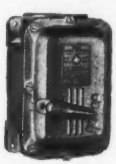
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FOR THOSE DANGER SPOTS IN WAR WORK



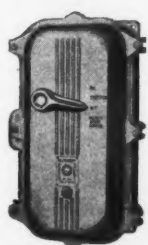
DANGER
Acetone

"De-ion" Motor Watchman for manual motor starting.
(Class I and II hazardous locations.)



DANGER
Naphtha

"De-ion" Linestarter for magnetic across-the-line motor starting.
(Class I and II hazardous locations.)



DANGER
Coal Dust

"De-ion" Combination Linestarter for circuit protection and magnetic motor starting.
(Class II hazardous locations.)



DANGER
Gasoline

Oil-immersed "De-ion" Linestarter for use in corrosive and explosive atmospheres.
(Class I hazardous locations.)

... use Westinghouse "De-ion" Controls for hazardous locations

Controls for motors must "make" and "break" circuits safely in spite of explosive atmospheres in ammunition plants, chemical, oil refining and other war industries. Production must be kept moving . . . and safely!

That calls for Westinghouse A-C Motor Control specifically designed for the job.

Cast-iron or welded steel enclosures with heavily reinforced sections and wide sealing flanges are designed in accordance with Underwriters' Laboratories specifications for Class I, Group D and Class II, Groups F and G hazardous locations.* For those applications where it is necessary to resist the effects of corrosive as well as explosive atmospheres, the Westinghouse line includes many combinations which are totally oil-immersed. These are designed in accordance with Underwriters' Laboratories specifications for Class I, Group D hazardous locations. Other design features keep maintenance at a minimum, provide complete accessibility when necessary.

Whether for replacement or for new installations in hazardous locations, specify Westinghouse Controls. Call your Westinghouse representative for his recommendations. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

J-21271

★ ★ ★

*Class I, Group D hazardous locations are those in which the atmosphere contains gasoline, petroleum, naphtha, alcohols, acetone, lacquer solvent vapors, or natural gas.

Class II, Group F and G locations include those in which grain dust, carbon black, coal, or coke dust is present in sufficient quantities to produce explosive mixtures.



Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

MOTORS AND CONTROL

TOP EFFICIENCY

with
**RLM Non-Metallic
Reflectors!**



Typical Wheeler convenience! Quick, easy access to operating parts by loosening two thumb-screws. Exclusive chain hangers support detached reflector. No loose screws, bolts or nuts to handle.

New "War-Aid" Fixtures insure availability of Wheeler SKILLED LIGHTING for war plants!

In spite of wartime metal scarcity, you can obtain fluorescent lighting fixtures with all the lighting efficiency and convenience of pre-war Wheeler "Skilled Lighting" units. Wheeler's 60 years' experience in better lighting has now produced top-standard "War-Aid" models requiring minimum metal!

Reflectors of "War-Aid" units are rugged non-metallic material. Non-flammable, moisture-resistant. Reflecting surfaces of chip-proof,

washable baked enamel provide minimum efficiency of 80% in 48" 2-lamp units; 73% in 3-lamp units; and 73% in 60" 2-lamp units. Available for individual or continuous-run installations.

Write for full details of Wheeler "War-Aid" Fixtures and catalog of Incandescent Fixtures. Wheeler Reflector Company, 275 Congress Street, Boston, Massachusetts. New York . . Cleveland. Representatives in principal cities.

Distributed Exclusively Through Electrical Wholesalers

Wheeler REFLECTOR COMPANY

Lighting Equipment Specialists Since 1881

*Questions
in the Code*

[FROM PAGE 80]

A. The new rule referred to is Interim Amendment No. 65 which has revised the first sentence of Section 2357 to read, "A service switch shall have a rating not less than the load to be carried as determined by section 2108."

This may result in a smaller switch that was previously used in some cases but may in other cases, result in the use of a larger switch than before.

Anyway, it means that we now have to compute the load in accordance with the square foot area plus appliance loads, which will result in the use of a switch of sufficient size to carry the expected load.

However, we must bear in mind that this service switch may be of higher carrying capacity than the feeder which it controls because the size of the feeder is computed according to Article 220 and advantage can be taken of the demand factors according to section 2203 while for the service switch we compute the size according to section 2108 without the use of those demand factors.

Bare Neutral Cable

Q. "The WPB says we cannot have conduit nor BX cable. My supply house says they can give me CNX. Is this latter cable approved for general house wiring?"—W.J.B.

A. There is quite a bit of confusion about the insulations which may be used with cables of the non-metallic sheathed type caused somewhat, by the fact that some people refer to all cables of this type as CNX. Let's clear this by stating that CNX is only a "trial installation cable" and is permitted only for trial installations where such installations are permitted by the inspection authority having jurisdiction. This cable has a stranded uninsulated conductor which may be used only as the grounded conductor and which is covered only by the outer fibrous covering over the entire assembly.

Before the present emergency we had non-metallic sheathed cable in which all conductors were fully insulated with rubber insulation. Then along came the emergency and there was approved Interim Amendment No. 46 which permitted the use of Type RU (Latex) insulation and synthetic type SN insulation wherever type R (rubber) insulation was acceptable. This of course, would permit the use of those insulations in non-metallic sheathed cable if any manufacturer wanted to make such cable.

building-block simplicity..

IN ELECTRICAL
CONTROL
ASSEMBLY...



Installation of four Motor Control Centers mounted back to back... 98" high, 21" deep, for each pair. CONTROL AT CENTER OR BY PUSH BUTTON AT MACHINE STATION.

CUBICLE PLUG-IN UNITS

Right: Control Center 13½" bus bar trough, with pull boxes top and bottom and Sizes 1, 2 and 3 motor control units. (Switchboard control units are in corresponding sizes).



CONTROL CENTER SWITCHBOARDS

Type "A" switch units, Type "AT" circuit breaker units, 30 to 600 amps. or combinations of both may be grouped in any desired assembly to centralize power and light feeder-circuit protection and control. Also, the standardization feature permits the combining of both motor control and switchboard functions in one assembly.

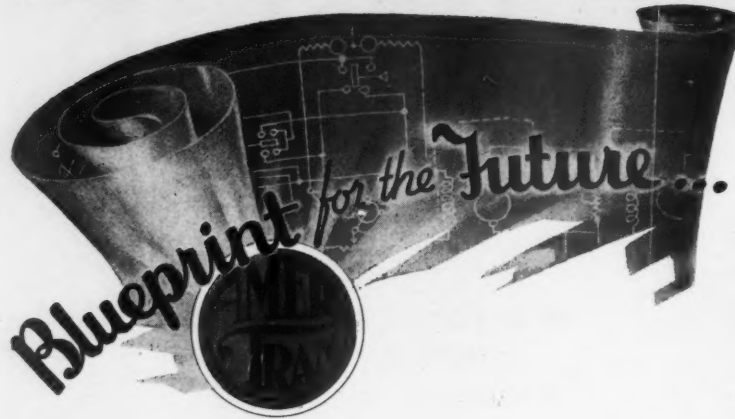
T
TRUMBULL
CONTROL
CENTERS

MOTOR CONTROL CENTERS...

The motor Control Centers are space saving assemblies in one cabinet of Trumbull combination magnetic starter with switch or circuit breaker disconnect. Sizes 1, 2, 3 or 4... 3 to 100 H.P. Regrouping or expansion at any future time is most easily accomplished. Trumbull Bulletin 411 on request.

THE TRUMBULL ELECTRIC MANUFACTURING COMPANY • PLAINVILLE, CONN. • A GENERAL ELECTRIC ORGANIZATION

OTHER FACTORIES AT NORWOOD (CONN.) O. — SEATTLE — SAN FRANCISCO — LOS ANGELES



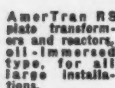
Serving America's War Work Now the Better to Serve all American Industry Later...

Here in AmerTran's factories under the accelerated tempo of war production, we are designing and building better transformers that will help meet the competitive conditions of the general business upswing of the future. Here in blueprint form, and in the shape of refined designs and improved construction, better AmerTran equipment is being produced to serve war-time America now . . . to serve peace-time industry later. Tomorrow these improvements will be available to the whole of industry for general commercial and industrial trans-

former requirements. The confidence you have placed in the AmerTran pre-war products you are using today—a confidence merited by 41 years of leadership—will be many times justified when the splendid results of the work AmerTran is doing today become generally available to a victorious American industry.



AmerTran modulation transformers and reactors, oil-immersed type, for large broadcast transmitters.



AmerTran RS plate transformers and reactors, oil-immersed type, for all large installations.



AmerTran W plate transformers and reactors for all small and medium installations.

AmerTran transformers are manufactured to meet your exact electrical and mechanical requirements.

AMERICAN TRANSFORMER COMPANY, 178 Emmet St., Newark, N. J.
Manufactured Since 1901 at Newark, N. J.

AMERTRAN

Questions
BY THE CODE

[FROM PAGE 82]

Then Interim Amendment No. 44 permits on a.c. systems, the use of slow burning weatherproof (Type SBW), weatherproof (Type WP) emergency insulated (Type EI) and any other approved type (Type EG) insulated conductors as the grounded conductors in any of the wiring methods of Articles 320 to 364. This permits these insulations for the grounded wire of non-metallic sheathed cable. Cables so made should not be confused with CNX for the former has more on the grounded conductor than an outer fibrous sheath.

Then along came Interim Amendment No. 69 which permits for non-metallic sheathed cable when to be run exposed in dry locations, the use of conductors having emergency insulation Type EI for the ungrounded conductors (hot legs) of the system. This, of course, does not permit the use of the bare wire for grounded conductor although the grounded conductor may have the SBW, WP, EI or EG insulations.

Most of the confusion however, has arisen over Amendment No. 43 which permits for use in *defense emergency buildings*, a non-metallic sheathed cable, "having one circuit conductor without individual insulation, but assembled with an insulated conductor, or conductors, beneath an overall fibrous covering."

Anyone then wanting to use this kind of cable, which is marked to identify it as such, should satisfy his inspection bureau that the building he is to wire, is a "defense emergency building."

It is important to keep in mind that WPB rules which bar rubber insulated neutrals does not require uninsulated neutrals. There are other insulations.



CORNERED in a lobby huddle, R. E. Ward (center), Electric Motor & Repair Co., Raleigh, N. C., airs priorities restrictions with R. B. James (left), Potter and Rayfield, Inc., Atlanta, Ga., and C. Wittmer, Emerson Electric Mfg. Co., St. Louis, Mo.

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hot arcs get the point *Quick!*



Arcs burn with terrific heat when they leap between opening contacts. The heavier the load... the hotter they burn. Switch contacts get badly pitted and burnt, unless the arc is both controlled and extinguished, *quick*.

Westinghouse Safety Switches eliminate this source of trouble. The diamond-pointed jaw carries the arc outside the contact area assuring long contact life.

On Safety Switches, 575 and 600 volts, Westinghouse adds another protective plus—the "De-ion" arc quencher.

This exclusive feature draws the arc up into the grids—divides and extinguishes it in the blink of an eye.

These advantages mean better, more dependable protection. Contacts stay clean, last longer. Time-outs for maintenance and inspection reduced.

Protect your important circuits with Westinghouse Safety Switches. Ratings up to 1200 amps, 600 volts. Call your Westinghouse representative today. Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa., Dept. 7-N.

J-21266



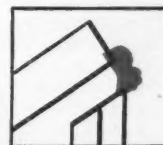
Westinghouse

PLANTS IN 25 CITIES... OFFICES EVERYWHERE

SAFETY SWITCHES

Electrical Contracting, March 1943

LIKE
THIS



Diamond-pointed break jaws confine arcing to the point... force the arc to break outside the current carrying areas. Contact surfaces stay clean, don't pit and burn.

NOT
LIKE
THIS



When ordinary safety switches are opened, the arc leaps across the contact areas... along the jaw and blade. It hangs on longer, burns and pits the contact surfaces.

These Easy-Working TAPES Can Help You Keep Customers

Show customers how they can repair present equipment with tape when you can't sell them the new things they need.

- ★ First to be Wrapped and Sealed in Cellophane
- ★ Perfect Adhesiveness and Tensile Strength
- ★ Strong Durable Core
- ★ Colorful Attractive Boxes
- ★ A Company in the Insulation Business Since 1878



HAZARD INSULATED WIRE WORKS

DIVISION OF THE OKONITE COMPANY

Wilkes-Barre, Pennsylvania Offices in Principal Cities

Sold Through
Recognized Independent
Wholesalers



3258

**PANTHER
and DRAGON**
Friction and Rubber Tapes

EQUIPMENT *News*

THESE ANNOUNCEMENTS of new equipment are necessarily brief—for more detailed descriptions, sizes, prices and other data write to the manufacturers' advertising departments, tell them in what issue of **ELECTRICAL CONTRACTING** you saw the item and they will send full details to you.

Lighting Fixture

This new fluorescent lighting fixture can be surface-chain or pipe mounted individually or in continuous runs. The wireway is of rigid metal construction and may be completely exposed for installation or maintenance. Ballast is inverted and exposed. Reflectors are of masonite. The 40-A series is available for two, three and four 40 watt and two 100 watt fluorescent lamps. Lighting Products, Inc., Highland Park, Illinois.



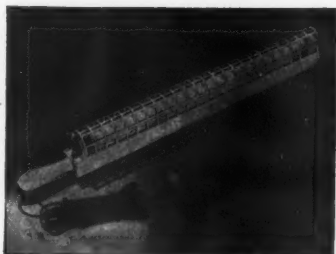
LIGHTING PRODUCTS FLUORESCENT UNIT

Floodlight

The Permalector enclosed floodlight ST-200 is designed to accommodate the medium base 200-watt incandescent lamp. This unit consists of a formed sheet steel housing equipped with a silver mirrored glass Permalector; convex heat-resisting cover glass; gasket; removable lens frame with clamp; porcelain socket; adjustable bracket and base; and corrosion-resistant, weatherproof cord grip fittings. Dimensions are height 12-in., diameter 8½-in. and length 11½-in. Pittsburgh Reflector Company, Pittsburgh, Pa.



PITTSBURGH REFLECTOR FLOODLIGHT



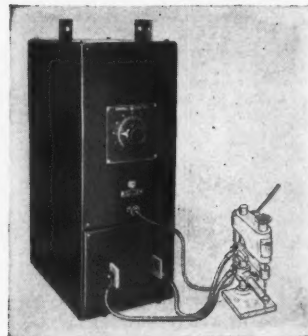
GUTH PORTABLE LAMP

Fluorescent Light

This new portable fluorescent lamp is known as the Extensolite and is for industrial use. It provides diffused lighting with low surface brightness, pleasing color and better visibility or shiny metal surfaces. It can be laid on any of three sides, can be held from its wooden-handle or can be suspended to a support from steel hook on one end. The channel acts as a reflector. The 10-foot cord extends through the wooden-handle to the ballast which plugs into the outlet. Units are wired for 100-125 volt, 60 cycle, a.c. Lamps are available in two sizes—6 watt and 15 watt. Edwin F. Guth Company, 2615 Washington Blvd., St. Louis, Mo.

Varnish

Synthite PX-5 black baking varnish is recommended for use on stationary and revolving units constructed with Class "B" insulating materials. It possesses the essential bonding properties which will hold modern types of magnet wire and insulating materials intact under the terrific centrifugal force developed by high speed unit windings. It cures by heat induced chemical polymerization which solidifies the varnish in winding voids or spaces. This varnish is recommended for use on flexible armature coils and on all types of bare, plain, synthetic coated, textile and glass covered magnet wire. It is suitable for applications by atmospheric dipping and vacuum impregnation methods. John C. Dolph Company, 168 Emmett Street, Newark, N. J.



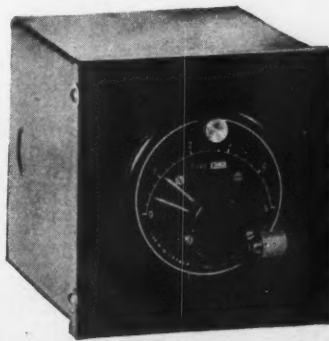
G-E SPOT WELDING CONTROL

Spot Welding Control

A new electronic half-cycle, synchronous control for the operation of resistance-welding machines has been announced. Mounted in a protecting cabinet, the control is furnished in two types; CR7503-A136, which includes a welding transformer, is designed for bench mounting; CR7503-A133, without a transformer, is designed for wall mounting. Both types can be used either with tongs or a bench welder. The control features a new tube, the GL-415; a new circuit and a simplified initiating circuit. It also incorporates heat control by the phase-shift method. General Electric Co., Schenectady, N. Y.

Timers

The new RS4 and RS5 synchronous motor driven timers are of the reset type and available for time ranges up to five hours and longer if desired. The RS4 timer has a double throw switch and opens or closes the circuit and starts by pressing and then releasing the start button, which resets the timer. The RS5 is held in a neutral position when the button is depressed and it starts timing cycle by pulling start button outwardly. These timers operate a single pole, double throw switch with a capacity of 10 amperes at 115 volts or 5 amperes at 220 volts a.c. non inductive load. They will control a ½ hp. motor load, a heater load of up to 1200 watts, a lamp load of up to 250 watts or a relay load which does not exceed 15 amperes inrush at 115 volts a.c. The R. W. Cramer Company, Inc., Centerbrook, Conn.



CRAMER TIMERS

**"Makes the
hard jobs
EASY!"**



The HARDER the Job, the MORE you appreciate Kondu

It goes on bent conduit as easily and quickly as on straight. Can be installed close to corners, or close to girders and partitions, just as easily as in the open.

And you save plenty of time and trouble on the ordinary jobs, too. Kondu is the easiest fitting to tighten up in perfect alignment. (Try it!)

Every Kondu fitting is a union and can be taken out of the line without disturbing conduit.

Takes either Thin-Wall or Thick-Wall conduit, with either a Threadless or Threaded connection—at any outlet.

Vibration-proof . . . self-locking, permanently tight. Practically unbreakable, 100% re-usable.

Write for the Kondu Catalog.

KONDU CORPORATION
Erie, Pa.



Now in our
new plant,
1040 West
12th St.

KONDU

The Threadless Fitting Line
of Unequaled Variety

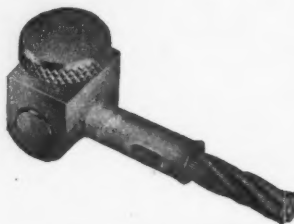


EQUIPMENT *News*

[FROM PAGE 87]

Connector

A new electronic tube stud connector, known as the Hystud, has been developed for use in joining flexible leads to filament studs of large electronic tubes. The Hystud, a Hyline indent-type of connector was designed for this purpose since it gives maximum compactness. The connector is assembled to the stud by means of a knurled thumb screw. The Hystud is installed on the flexible lead by means of the Hypress. Burndy Engineering Co., Inc., 459 East 133d Street, New York, N. Y.



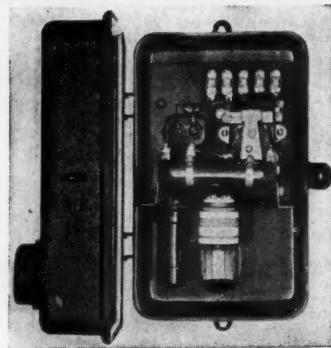
BURNDY STUD CONNECTOR

Circuit Breaker

The improved Type AC Thermag circuit breaker combines the time-delay action of the thermal trip with the magnetic trip. Some of the new features are magnetic trip for short circuit instantaneous tripping; handle signal for single pole with automatic reset; signal button on double pole for trip indicator; magnetic arc quencher; line and load contacts recessed; flexible connections between terminals and interior parts; non-welding type contacts; interchangeable with original Type AC circuit breaker. Available in all standard and narrow column type panelboards and in dust-tight panelboards. Capacities: 50 amps. or less, 120 volts a.c., single or double pole. Frank Adam Electric Co., 3650 Windsor Place, St. Louis, Mo.



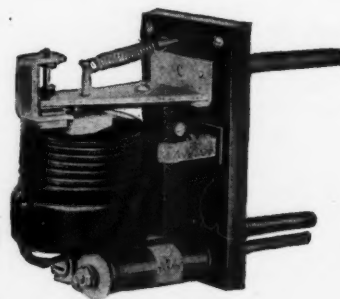
F-A THERMAG CIRCUIT BREAKER



PHOTOSWITCH CONTROL

Controls

A new series of improved photoelectric controls, Type A15, has been announced. Relay contacts are designed to handle heavier loads directly, and rated at 10 amperes a.c. at 115 volts. Output terminals are those of a single-pole, double-throw switch, for either normally closed or normally open operation. This provides for action either when light beam is broken or when it is made. Operating range of Type A15 is 20 feet with light source L30, and 40 feet with light source L60. Type A25 is supplied with light source L30 for 50 foot operation, and with light source L60 for 100 foot operation. Industrial uses are counting, conveyor control, machinery safeguards, signal and alarm systems, motor or valve control, inspection and break detection. Photoswitch Incorporated, 19 Chestnut Street, Cambridge, Mass.



G-E RELAY

Relay

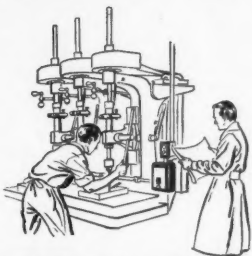
An automatic battery-cutout relay, Type HAP, for use in ship service and in any application where batteries are charged from generators, is now available. When the battery voltage is lower than the voltage of the starting source, the relay closes the charging circuit. When the charging voltage drops to a value below the battery voltage, the relay opens the circuit on a small reverse current. Continuous current ratings available are 2.5, 4, 6.5, 10, 16, 25, 40, 65 and 100 amperes. Voltage ratings are 7.5 volts (3-cell batteries) to 300 volts (120-cell batteries). The relay is set to pick up at slightly below the normal charging voltage. General Electric Company, Schenectady, N. Y.

Electrical Contracting, March 1943

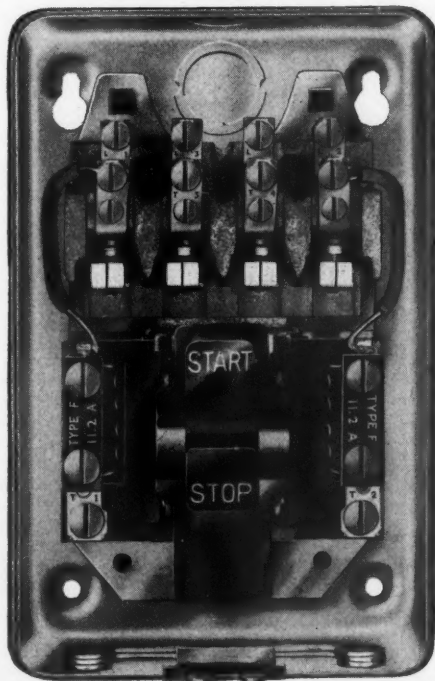
Be Sure with COLT Engineered CONTROLS



Above... Colt "Protectit" — compact manual starters for small power units.



Below... Colt Manual Starter with automatic relatching mechanism.



To those responsible for the performance of motor controls, Colt *Engineered Controls* offer...

Quality — an accepted trait of all Colt products for more than 107 years.

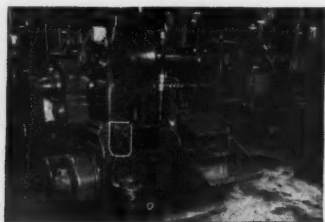
Performance — the kind that lives through "starts" and "stops", loads and overloads, year after year.

Standard and Custom-built Units—a compact manual starter for a tiny fractional H.P. motor or a complete control panel for multi-motored machines.

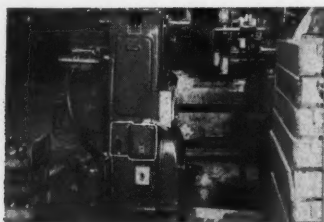
Call in an experienced Colt Engineer; from the complete line of Colt Industrial Controls he can recommend the equipment that exactly meets your needs.



PRODUCTION PARADE..... COLT Installations



Colt Manual Starter on Milling Machine



Colt Manual and Magnetic Starters on Hand Miller



Colt Magnetic Starter and Push Button Station on Drill Press

COLT'S PATENT FIRE ARMS MFG. CO., ELECTRICAL DIVISION, HARTFORD, CONN.

Latrobe PRODUCTS

★ FLOOR BOXES ★ WIRING SPECIALTIES ★

HIGH
QUALITY

FLEXIBLE AS TO USE
EASILY INSTALLED
DEPENDABLE

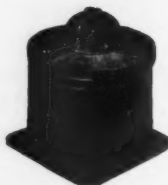
EASILY
INSTALLED

You can sell Latrobe Floor Boxes and wiring specialties in full assurance of their useability, economy and dependable performance. Latrobe Products may be easily and quickly installed—Time-Savers. The line is complete for Industrial, Commercial and Residential jobs.



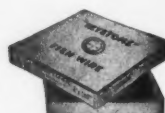
**Bull Dog
Insulator Support**

Malleable Iron-High tensile strength. Four sizes for standard porcelain and glass insulators.



**No. 150 Box with
No. 270 Nozzle**

Underwriters' approved—suitable for installation in concrete floor—Tops easily adjusted.



**Keystone
Fish Wire**

Made of high grade flat steel wire properly tempered—Ten sizes—Standard Coils, 100 feet, 150 feet, 200 feet. Other lengths available.



**No. 480 "BULL DOG" ARMORED
CABLE SUPPORT**

Light but very strong. Convenient for hanging armored cable to steel work. Electro plated, case hardened cup point set screw. Dependable for temporary or permanent jobs.

FOR BEST RESULTS
STOCK LATROBE PRODUCTS
SELL LATROBE PRODUCTS

DURABLE



ECONOMICAL

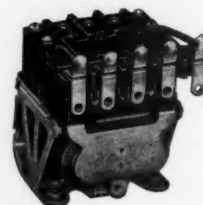
FULLMAN MANUFACTURING CO.
LATROBE . . . PENNSYLVANIA

EQUIPMENT *News*

[FROM PAGE 88]

Relay

The new G-M 3PDT Type 27 relay was developed particularly for aircraft use but has numerous advantages for other specialized uses. Relay No. 12814 measures 2- by 1½- by 2½-in. and weighs five ounces. Its characteristics are: — acceleration; nominal coil voltage, 12 volts d.c.; pick-up, 6.5 volts (.92 watt) at 20° C.; coil wattage at 12 volts d.c.; 3.2 watts; contact pressure, 60 grams; contact capacity, 10 amperes at 30 volts d.c.; temperature rise 32° C., at 12 volts d.c. G-M Laboratories, Inc., 4326 North Knox Avenue, Chicago.



G-M RELAY

Switch

This new improved automatic transfer switch is so designed that all contacts are carried on one shaft and operate in the same direction. There is no interruption nor lag in the transfer of a load from normal to emergency service. One magnet frame with the coil connected to the normal supply line holds the normal contacts closed and the emergency contacts open during normal operation. On failure of normal service the normal contacts open by gravity, and emergency contacts close by means of individual compression springs on each contact. Units are made to operate from a.c. to a.c., a.c. to d.c., or in any combination. Switch is available in one, two, three and four pole types and 18 capacities from 30 to 600 amperes. Zenith Electric Co., 152 W. Walton Street, Chicago, Ill.

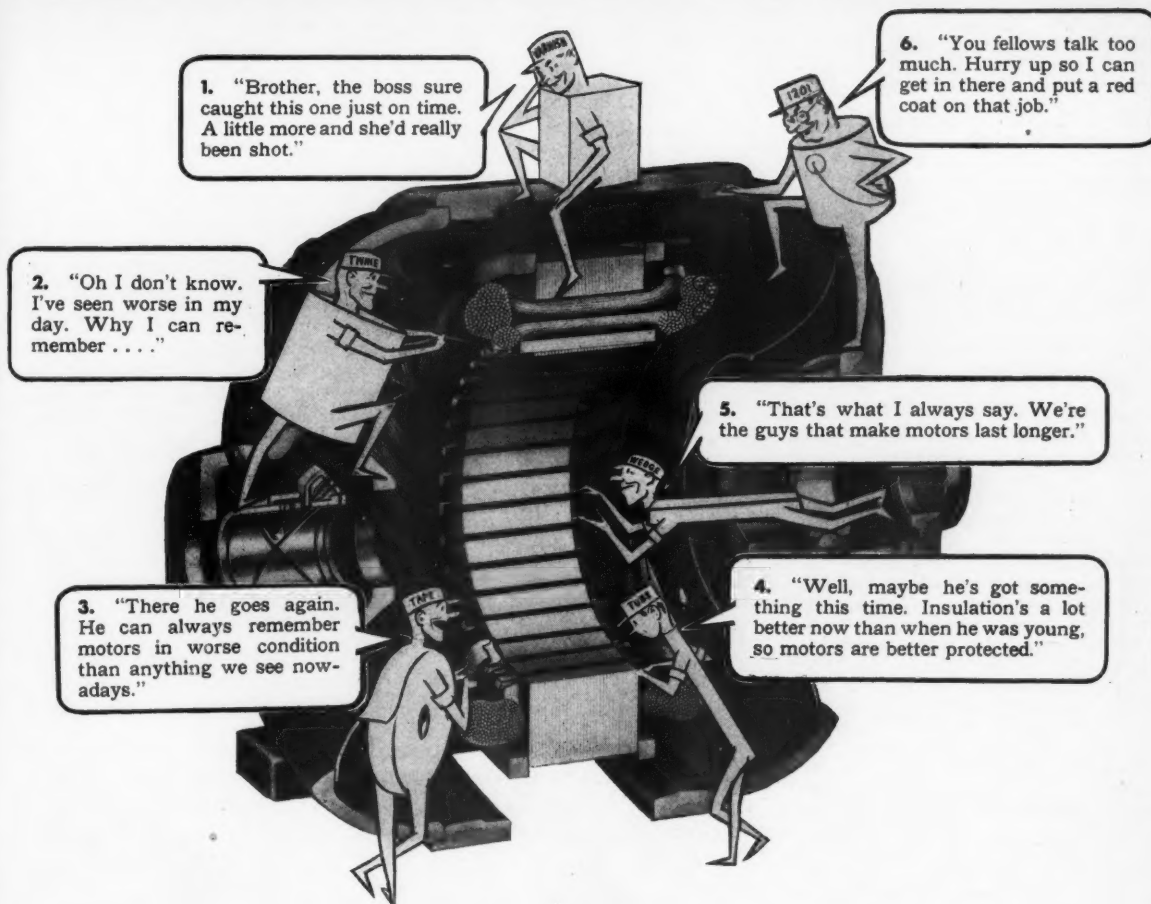


ZENITH SWITCH

Electrical Contracting, March 1943.

PROTECTING MOTORS

For Longer Life



THERE'S A G-E INSULATION FOR EVERY NEED

These are only 6 of a complete line of insulation materials designed for service under all conditions. For additional information and catalog giving complete details, write to Section M332-8, Appliance and Merchandise Dept., General Electric Co., Bridgeport, Conn.

GENERAL ELECTRIC

In the News

NISA REVIEWS NEW REGULATIONS AT CINCINNATI CONFERENCE

Details of the new Controlled Materials Plan relating to the electric motor repair industry, price control and methods from shop experience for gearing the industry to the second year of war were discussed at the tightly scheduled Wartime Conference of the National Industrial Service Association in Cincinnati on January 27 and 28. Representative members from more than 200 shops attended. The program was strictly business. The social affairs usually scheduled at NISA meetings were omitted to take full advantage of the short session.

A unanimous vote on the recommendation of the nominating committee elected Charles F. French, French-Gerleman Electric Co., St. Louis, Mo., to the presidency. R. B. Turner, Johnson Turner Electric Repair and Engineering Co. of Windsor, Ont., was elected vice president; Wm. H. Braunlich, Braunlich-Roessle Co., Pittsburgh, Pa., secretary and Selden F. High, G. W. Sullivan Electric Co., of Cincinnati, Ohio, treasurer. T. L. Rosenberg of Oakland, Cal. and Wm. S. Giles of Marion, Ill. were named directors at large.

High spot of the conference was the discussion of CMP and its details as they relate to the service shop. The broad objectives of the plan were presented by Arthur M. Seed, Senior Analyst of the Cincinnati WPB office. Detailed discussion was conducted by Secretary Clarkson with the cooperation of Dewey Crim, Repair and General Service Section, WPB. Arriving at the conference suffering from an illness which made it impossible for him to personally conduct the session Mr. Crim carried on by answering questions submitted to him and the answers were then reported at the convention.

From this session the members heard that shops are classified as Class B II producers though they are not actually manufacturers, a similar ruling to that which brought the industry under PRP.

Details of qualifications were given and the filing of the CMP 4B form omitting Sections A and B explained. Motor shop operators were urged to qualify under CMP whether now operating under PRP or through PD-1A applications. Although materials will still be available through these other procedures, CMP allotment numbers will take precedence.

E. J. O'Boyle, of the War Manpower Commission, speaking on the draft, advised shop managers to list their employees under thirty-eight years of age and liable to army service, on the Replacement Schedule form in order to gain time for training substitutes.

A. C. Eckerman of Wright Aeronautical Corporation, advising on the selection of new employees, suggested that the hiring of women employees for shop work be handled by men, but that their labor be supervised by women. This procedure makes for greater production and fewer difficulties he said.

John Gamell, chief, Electrical Equipment Section, WPB explained the operation of the limitation orders affecting motor applications. Representatives of the OPA reviewed Maximum Price Regulation No. 136 and its relation to the sale of used motors. W. T. Stuart, managing editor, *Electrical Contracting* discussed the

place of the industrial service shop in a war economy and what NISA is contributing to the industry.

It was revealed that NISA had more than doubled its membership in the last two years and now numbered some 506 active and associate members. Specially honored by the Board and the Conferees for outstanding service to NISA and the whole electric service trade was H. A. Holden, of H. A. Holden, Inc., Minneapolis, who had added forty members to the rolls by his own efforts. A chapter is to be formed consisting of a number of these recruits.

INSPECTORS HANDLE L-225 CODE CONFLICTS

When the WPB issued Limitation Order L-225 restricting the sale and installation of conduit and other metallic raceways to an A-I-J or better priority and only on jobs where conductors must for safety purposes be protected from mechanical injury or are in Class I, II, III, or IV hazardous locations, A. J. McGivern, secretary, Chicago Electrical Wholesalers Association, saw confusion arising in the Chicago area. Wheels began clicking and he set about to find a solution.

The Chicago problem is this: the City Electrical Code, which takes precedence locally over N.E.C. and federal rulings, provides that practically all wiring installations shall be in conduit. Also, who is to be the authority to determine whether an installation fell within one of the above



"Throw over that roll of No. 14, some insulators, my compact and the pliers."

ONLY AN ELECTRICAL WHOLESALER COULD THUS SPEED WAR PRODUCTION



Emergency airfields glowed 52 days earlier

Wesco Made Special Light Standards and Shipped "Floods" to Icy Coast in 18 Days

A large airlines company was in dire need of sixteen 500 watt floodlights and portable, adjustable, special standards for lighting emergency landing fields in the foul weather of the frigid Northwest Coast. For 5 weeks an order had been placed with the manufacturer of the equipment. Word then came of a minimum 5 more weeks before delivery. The airlines company appealed to Wesco for help.

The local Wesco House responded at once—arranged for special floodlight standards and bases, supervised the necessary tapping, drilling and other machining, selected the floodlights from its own large stocks and started the entire shipment on its way North in 18 days.

The aptitude of Wesco men to render emergency services beyond the scope of routine duty is no accident. It is the result of years of training, experience and initiative. Now devoted to winning the war, Wesco's "know how" will be at the command of industry and commerce when peace returns to the world.

WESCO SPEEDS PRODUCTION

- * A special heat-treating oven was needed immediately by a tank builder. With Wesco's aid, an oven was designed, built, wired, and on the job in 48 hours.
- * Synthetic rubber plant gets needed material in 3 days from Wesco. Delivery from manufacturers meant a six to ten weeks delay.

WESCO SERVES BUSINESS

- * By warehousing stocks in anticipation of customers' needs.
- * By furnishing informative and technical data.
- * By providing trained sales and engineering personnel.

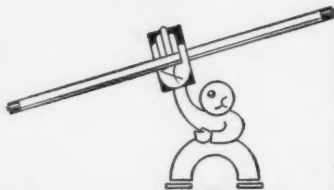
Westinghouse Electric Supply Co.

150 VARICK STREET • • • NEW YORK. N.Y.

A NATIONAL DISTRIBUTING ORGANIZATION WITH 80 BRANCHES

"LONG LIFE"*

says:



"ONLY ARTKRAFT
GIVES YOU A 3,000-
HOUR GUARANTEED
FLUORESCENT LAMP!"

SIGNS* OF LONG LIFE
Artkraft Hot Cathode Fluorescent Lamps are actually guaranteed for 3,000 hours and have a rated life of 5,000 to 6,000 hours. They have been field tested for over five years under adverse conditions. Artkraft lamps feature a Constant-Temp hot cathode with a corrugated mesh-ribbon filament, which permits the use of an abundance of emissive compound. By controlling the temperature of the filament through the Constant-Temp feature, the cathode is not affected by fluctuations in the primary voltages, thereby protecting the emissive compound from being rapidly discharged. Artkraft's exclusive cathode design reduces blackening or darkening in the light column, resulting in a brighter, cleaner lamp. These, with other Artkraft exclusive features, make it truly a lamp of "Long Life."

**OTHER EXCLUSIVE
ARTKRAFT FEATURES:**

NO STARTER SWITCHES. Artkraft resonant starting eliminates this trouble-maker.

CONSTANT VOLTAGE POWER PACK. Gives efficient operation at 85 to 135 volts. Can also be used on 220- and 440-volt systems, single or three-phase. Cannot short circuit the line.

100% POWER FACTOR. at rated voltage. 98% or over within 85- to 135-volt range.

"EASY MOUNT" LUMINAIRE ALLOWS INSTANT REMOVAL WITHOUT TOOLS. FOR CLEANING NON-FERROUS REFLECTOR OR LAMPS.

Also

STROBOSCOPIC (FLICKERING) EFFECT REDUCED.

MORE LIGHT FOR THE SAME CURRENT. MODERATE FIRST COST. RADICALLY REDUCED MAINTENANCE COST. Lamp replacements are less frequent, starter replacements eliminated, ballast replacements unknown, man-hours saved by making these replacements unnecessary.

Write for circular F102

WHOLESALEERS:

Write for our proposition.

FIXTURE MANUFACTURERS:

Write for details on our fixture manufacturing license.

**ARTKRAFT HOT
CATHODE
FLUORESCENT LIGHTING**

Division of
THE ARTKRAFT SIGN CO.

1113 E. KILBY ST.
LIMA, OHIO, U. S. A.

*Reg. U.S. Pat. Off.

In the News

[FROM PAGE 92]

categories? Neither the WPB, contractors, plants, nor wholesalers could designate, officially or otherwise, that such a condition existed.

The electrical inspector is the only one in a position to make an official interpretation. So Mr. McGivern went into session with D. J. Talbot, Acting Chief Electrical Inspector of the City of Chicago and they emerged with the following solution.

1. Plants requiring electrical work will apply to the city for a permit.

2. The City Electrical Inspection Department will assign an inspector, specially trained in plant survey work, to make a careful survey of the plant and determine the type of wiring that can be installed.

3. The inspector's decision on hazardous conditions and type of wiring will be official and final. He will recommend conduit installations where absolutely necessary to safeguard life and property, and only where other means of mechanical protection are not feasible.

4. If conditions requiring mechanical protection are not present, the inspector will assist the plant in determining the best alternate wiring method to use in compliance with federal restrictions.

5. If the wiring is of an alternate type, a temporary permit good only for the duration of the war, will be issued.

6. At the end of the emergency, these temporary permits will expire and the wiring must be rehabilitated to conform to the City Electrical Code.

This plan, now in operation in Chicago, received the wholehearted approval of local WPB officials and all concerned. It places the burden of official interpretations squarely on the shoulders of the electrical inspection department—where it rightfully belongs. It also provides a means of policing substandard electrical installations that



NORTH AND SOUTH meet at the Turners, R. B. (left) of Johnson-Turner Electric Repair & Eng'g. Co., Windsor and London, Ontario, Canada; and J. Arthur of Tampa Armature Works, Tampa, Florida, get together at the NISA War Conference in Cincinnati.



INGENIOUS APPLICATION of existing equipment for the duration was the advice given NISA members at the Cincinnati meeting by John Gamell, Chief, Electrical Equipment Section, WPB, Washington, D. C.

are meant to be only of a temporary nature. And it will materially help in reducing the "when and where" inquiries that undoubtedly would flood local WPB offices concerning the use of conduit under the limitation order.

**WOMEN ELECTRICIANS
USED IN SHIPYARDS**

A tour of the Oregon, Swan Island, Willametter and Commercial shipyards in the Portland, Oregon area reveals that women electricians are replacing men in all phases of ship wiring.

Women have found their niche in electrical work. They can be found working from the bottom of a ship at the ways to the top of mast at the outfitting dock. When women were first employed as electricians, it was believed they could replace men only in the shops. After experimenting, it was found that they could be used at the ways, in layout, maintenance work, and on installation and hooking-up of all types of wiring, as well as in the shop and assembly work. As a matter of fact, on some types of electrical work, it was found that women were exceptionally fast.

Electrical heads unanimously agreed that it would be necessary to employ many more women. They are in particular need of active women for work aboard ships, and they said that because this work was outdoors, women must be in perfect physical condition. They must be young and not overweight. They mentioned that there is considerable climbing of ladders and a big part of this work is overhead.

The Oregon Shipbuilding corporation was the first shipyard to use women in shops and the first to start using them aboard ship. Jim Ware, marine electric supervisor at Oregon, was enthusiastic about the work performed on shipboard by some of these women.



1943

FIFTY YEARS

devoted exclusively to the design and manufacture of
electrical equipment for circuit protection

★ SHAWMUT IS THE WORD FOR FUSES ★

The Chase-Shawmut Company
Newburyport, Massachusetts

1893



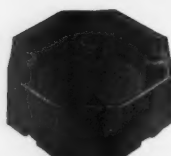
Save with ILLINOIS All Porcelain WIRING SYSTEMS....

- ★ USE LESS VITAL MATERIALS
- ★ DO JOBS IN LESS TIME
- ★ CUT MAINTENANCE

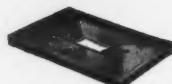
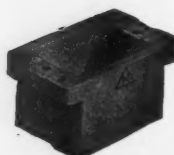
For the customer, porcelain protected wiring systems mean permanency of installation, economy, safety, dependable service where dampness and fire hazards are prevalent.

Illinois all porcelain wiring systems are adaptable to practically all wiring plans and layouts—they are easy to install and can be installed without grounding.

Porcelain is not a critical material—use it for your next installations.



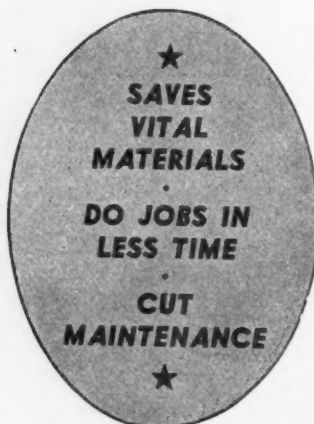
OUTLET BOXES AND COVERS



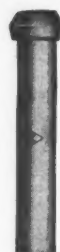
SWITCH BOXES AND COVERS



TOGGLE SWITCH PLATE



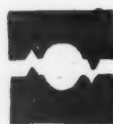
Look for this Trade Mark



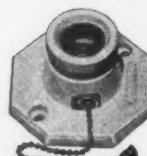
STANDARD TUBES



STANDARD KNOBS



CLEATS



LAMP HOLDERS

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS

In the News

[FROM PAGE 94]

Mr. Mageehon, supervisor of electricians at Willamette and Mr. Chrysler, general superintendent of electricians at Commercial announce that they are starting to use women on outdoor work aboard ships.

Swan Island has been successful in using women in hooking up main switchboards aboard ship. Supervisors point out that more women will be used on layout and cable installation and must be trained for this type of agile outdoor work.

Fred Began, Co-ordinator of Electrical Training, War Production Training Program has anticipated the demand for this aboard ship work for women and now has classes specializing on the types of electrical training for ship wiring at the ways and outfitting dock. At the Marshall school, Portland, compartments, staterooms and switchboards have been built, simulating actual ship conditions. There women are taught how to handle tools, how to install cables and wiring, how to hook-up switches, fixtures and switchboards, and to read blueprints.

Joe Lake, business agent IBEW local No. 48b says that 2,000 women will be hired for this work by March 1, 1943.

LICENSE WARNINGS TO BE ISSUED IN STATES

State Directors and District Managers of the Office of Price Administration have been granted authority to issue license warning notices to licensed sellers who in their judgment have violated price regulations.

Formerly the power had been delegated only to Regional Directors. The order



MANNING TABLES, their function and application, were explored at the recent War Conference of the Motor Shop Industry at Cincinnati, by E. J. O'Boyle, Assistant Chief, Division of Manning Tables, War Manpower Commission.

Electrical Contracting, March 1943

HERE'S HOW...

Westinghouse Lighting helps Small Plants convert faster

Today, many small plants are converting to war production. Such change-over usually requires better lighting—modern lighting—and in a hurry.

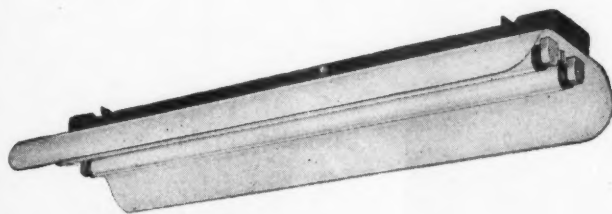
To help get your plant into war production faster, Westinghouse offers a complete lighting service. First, we are producing complete lines of lighting units—fluorescent, incandescent and high intensity mercury fixtures for specific industrial operations. Second, we offer experienced Conversion Lighting Counsel to help you obtain the lighting system you need.

For instance, you can choose from a complete line of fluorescent luminaires with nonmetallic reflectors for 40-watt, 100-watt and continuous strip installations. Whether it's for precision work or general illumination, we have the proper lighting for the job.

Providing the right lighting for industry is an all-out war job at Westinghouse today. And—117



Westinghouse Electric & Supply Company Offices and Independent Lighting Distributors will gladly help you with any conversion lighting problem. Or, write Westinghouse Electric & Manufacturing Company, Edgewater Park, Cleveland, Ohio. Plants in 25 Cities: Offices Everywhere.



EXAMPLE

Westinghouse fluorescent luminaires are particularly adaptable for lighting workbenches, assembly operations, machine tools, inspection tables and for precision work of all kinds.



"Tune in the Westinghouse program, starring John Charles Thomas, Sundays, 2:30 P.M., EWT."

Westinghouse *Lighting Equipment*

INDUSTRIAL FLUORESCENTS

**Stock on Hand
Full Quality
High Power
Wiring**

Illustrated is
the No. 1000,
Two-lamp, 40-
watt, Porcelain
or Baked En-
amel Industrial
Unit.



Porcelain unit
lists at \$11.00,
less lamps. Baked
enamel lists at
\$9.25, less lamps.
Two-lamp, 100-
watt porcelain unit lists at \$25.00, less
lamps. Equipped with well-known
brand ballasts, starters, and sockets.

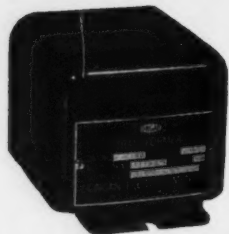
PRIORITY SALES ONLY

STANDARD ELECTRIC CO.

1143 DeKalb Ave.

Brooklyn, N. Y.

**Lower the Cost
of LOCALIZED
LIGHTING...**



A dry-type, power circuit transformer
especially designed for lighting ma-
chine tools. Eliminates the cost of in-
stalling separate lighting circuits. Re-
duces power circuit from 460 and 230
volts to 115 volts.

WRITE

for booklet on Power Transformer Con-
struction and Connections.

**DONGAN
ELECTRIC MFG. COMPANY**

2985 Franklin

Detroit, Mich.

"The Dongan Line Since 1909"

**DONGAN
TRANSFORMERS**



[FROM PAGE 96]

further decentralizes enforcement admin-
istration of OPA regulations and places the
power in the hands of officials in a po-
sition to be more intimately acquainted with
the business conditions in their districts.

OPA price regulations automatically
grant a license to retailers and wholesalers
and to specified other sellers as a condition
of selling. License warning notices are
sent by registered mail to sellers who, in
the judgment of OPA officials, have vio-
lated price regulations. If a seller commits
another violation after receipt of the warn-
ing notice, OPA may go into court and ask
that his license be suspended for a period
of not more than one year.

The delegation of authority is contained
in Revised General Order No. 27 which
was issued and effective on January 22.

TWIN CITIES CONTRACTOR GROUPS ELECT OFFICERS

At recent meetings of the electrical con-
tractors in St. Paul and Minneapolis,
Minn., officers and directors were elected to
guide the affairs of the respective associa-
tions during the coming year.

For the St. Paul Electrical Contractors
Association, the following were chosen:
president, D. F. Kehne; vice-president,
Wilbur Hoffman; secretary, August E.
Hanson. Directors are Mike M. Paul, R.
L. Gombold, and Joseph Fischler. Elected
as Directors to the Minnesota Electrical
Council, Inc., are: W. F. Lindberg, Paul
Schorr, Sr., and D. F. Kehne.



TRAINING DEMONSTRATION is
given NISA War Conference delegates
as Walter P. Hildebrand, Training
Within Industry Branch, WPB, shows
the conference stenographer how to tie
the Underwriters Knot.

New officers of the Minneapolis Electri-
cal Contractors Association include: presi-
dent, C. S. Williams; vice-president, O. H.
Batzli; and secretary-treasurer, F. M.
Tripp. Directors are: Al Strohmeier, A. L.
Glatty, Art Starbird and Al Larson.
Chosen to be Council Directors were F. M.
Tripp, A. L. Glatty and C. S. Williams.

LAUNCH COURSE IN WARTIME LIGHTING

A practical elementary course in illumi-
nation, featuring wartime applications, was
launched, Feb. 28, at the Chicago Lighting
Institute and will continue as a two-session
per week course for a period of 16 consecu-
tive weeks. Sponsored by the Illinois In-
stitute of Technology and the Chicago Light-
ing Institute, the course is open to men and
women within or without the lighting in-
dustry who have either a direct or indirect
contact with the field of illumination; also
anyone interested in the subject and meet-
ing the requirements. These include: a
high school education or its equivalent in
experience; an elementary knowledge of
alternating and direct currents; and em-
ployment in a war industry.

Two sessions will be held each week, the
first in the Chicago Lighting Institute
covering theory from elementary knowledge
of the eye and illumination through to the
design of lighting systems and the utiliza-
tion of existing wiring systems to the best
advantage. The second weekly session on
laboratory practice, held at the Illinois In-
stitute of Technology, began with the applica-
tion and use of instruments and laboratory
equipment and will end with the prepara-
tion of a complete lighting survey of a
shop area.

There is no tuition required for the
course. Costs are being underwritten by
the United States Office of Education
through its Engineering, Science and Man-
agement War Training Program.

John Harrington, lighting engineer, Com-
monwealth Edison Company, Chicago, is
the instructor for the course. The Advis-
ory Committee is composed of the follow-
ing: J. E. Hobson, P. G. Andres, and F. A.
Rogers of the Illinois Institute of Tech-
nology; and L. V. James, R. G. Raymond,
G. K. Hardacre and Carl W. Jensen—rep-
resenting the Chicago Lighting Institute.

COMING MEETINGS

Midwest Power Conference—Palmer House,
Chicago, Illinois, April 9-10.

**National Electrical Manufacturers Associa-
tion**—Spring Meeting, Palmer House,
Chicago, Illinois, April 19-23.

North Central Electrical Industries—War-
time conference, Hotel Radisson, Minne-
apolis, Minn. Participating groups
include: North Central Electric Associa-
tion; Minnesota Municipal Utilities; Min-
nesota Electrical Inspectors; Minnesota
Electrical Council (contractors and deal-
ers); and North Central Electrical Indus-
tries, April 26-27.

National Fire Protection Association—
Palmer House, Chicago, Illinois, May
10-14.

**International Association of Electrical In-
spectors**—Western Section, 39th annual
meeting, Chicago, Illinois, Sept. 13-15.

Electrical Contracting, March 1943

KEEP EVERY TOOL IN THERE

Fighting

Prompt Factory Reconditioning

- No Priorities Needed
- Thru your Supply House
- Big Savings to you
- New Parts Guarantee

RIGID Wrench Jaws

Your RIGID wrench jaws
Factory Reconditioned
1/2 PRICE
Plus small shipping charge

RIGID
Wrench
Hookjaw

RIGID
Wrench Heeljaw with pin

RIGID Threader Dies

Dies for RIGID No. 65R Series

Your RIGID dies
Factory Reconditioned
44¢ PER SET
OF 4
Plus small shipping charge

Dies for RIGID No. 11R Series

Dies for
RIGID
No. 00R, OR,
11R and 3-way
Series

THIS IS NO TIME for tools to lie around waiting for repairs — like every gun, every tool is needed. . . . Collect all your old worn RIGID Wrench Jaws and Threading Chaser Dies now, turn them over to your Supply House and order Factory Reconditioning. Service is prompt — you don't need priorities! Parts you send are carefully inspected to make sure they are worth reconditioning — we reserve the right to reject them if they can't be made good as new. . . . Remember: *only RIGID trademarked parts accepted for this service.*

Quick Reconditioning of your RIGID Wrench Jaws

Both hook and heel jaws are scientifically annealed in our automatic electric furnaces, same as new jaws • They are recut in the same machines and by exactly the same methods as used for new jaws • Jaws are then re-hardened like new • After final inspection, they are returned to you under regular RIGID new parts guarantee of satisfaction.

Quick Reconditioning of your RIGID Chaser Dies

Threader dies are accurately re-ground to original specifications. They are then inspected and tested and sent back to you under RIGID new parts guarantee.

This service is available only in the United States. . . . Act now — keep every tool in there fighting to win the war.

THE RIDGE TOOL COMPANY • ELYRIA, OHIO, U.S.A.

RIGID

★ PIPE TOOLS ★

*Fast-Working Tools for War.
and the Busy Peace that's Coming*

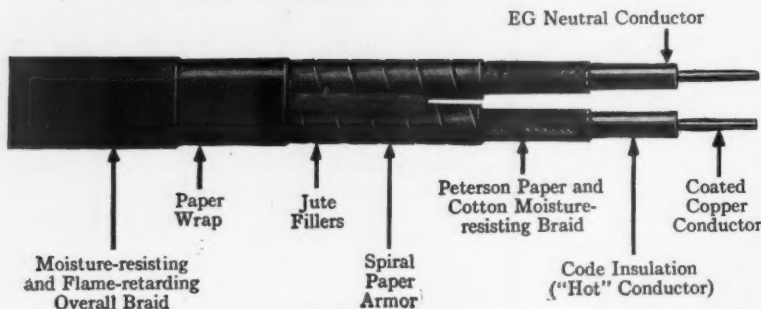


Choose

G-E BRAIDX

(Non-metallic Sheathed Cable)

FOR POWER DISTRIBUTION
on Maintenance, Conversion and New Wiring Jobs



This sturdy non-metallic sheathed cable—with moisture-resisting and flame-retarding braid—will provide dependable power distribution for wartime requirements. Use it instead of rigid conduit or EMT wiring or BX **except in hazardous or wet locations**. You'll find it ideal for maintenance wiring, conversion wiring or new wiring.

G-E BraidX, 2- or 3-conductor, is available in sizes 14 to 4. It is carefully made of the finest materials. A complete line of boxes and fittings is available. G-E BraidX is approved by the Underwriters' Laboratories.

For further information see the nearest G-E Merchandise Distributor or write to Section C331-B, Appliance and Merchandise Dept., General Electric Company, Bridgeport, Conn.

GENERAL  ELECTRIC

In the News

[FROM PAGE 98]

IDEA CLINIC AT INDIANAPOLIS

While the city of Indianapolis lay quiet under a practice dim-out on the night of January 22, some 1100 key men of surrounding industrial plants gathered at the Arsenal Technical High School to exchange their production and maintenance ideas and experiences. This War Production Clinic was sponsored by the Engineering Groups at the request of the War Production Board. Primary goal was the exchange of information and experience on war production problems in the interest of a more intense development of industrial resources for total war.

The Clinic was divided into seven major panels for the discussion of problems of machine shop; jigs, fixtures and tool making; forging, deep drawing and presswork; metallurgy and foundry; electroplating and finishing; welding; and maintenance problems. Three separate meetings under the maintenance panel covered: general maintenance of buildings and grounds; machine repair and maintenance; and electrical maintenance of motors, controls and lighting.

The electrical section, arranged through the Electric League of Indianapolis, Maintenance Division, was led by J. A. Drogue, plant engineer, RCA Victor Div., Radio Corp. of America, in the absence of John Webb, electrical engineer for Eli Lilly & Company. More than 200 electrical maintenance men took part in a round table discussion of maintenance kinks and repair ideas. Questions were directed to the audience as well as a Board of Experts that took on all comers. Members of the Board included: J. A. Drogue; Paul L. Ritter, Bridgeport Brass Co.; John H. Ferguson,



THE ABC OF CMP—Arthur M. Seed, Senior Analyst, Cincinnati Office, WPB, presents a simplified explanation of the "Why and How" of the Controlled Materials Plan at the recent NIS War Conference.

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WIREMOLD

HELPED TO BUILD HER . . . AND
WIREMOLD HELPS HER FIGHT!

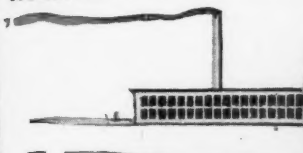


PHOTO: EWING GALLOWAY

YES, there's Wiremold in a tank . . . to contain the vital wiring circuits that keep her engines running and her electrical controls in operation.

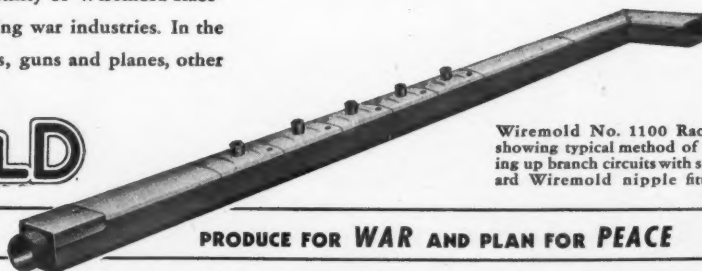
Wiremold No. 1100 Raceway, with standard and special fittings, was selected for this war service and also for use on armored cars and gun carriers because of the PROTECTION afforded circuits run in this strong steel raceway . . . because of EASE and FLEXIBILITY in picking up branch circuits from the ends or intermediate points in the raceway . . . because individual circuits can be INSPECTED, REPAIRED or REPLACED quickly and easily without ripping out the entire wiring system . . . and because Wiremold Raceways aid in providing EFFECTIVE SHIELDING against radio interference.

This is just one of the many ways in which the time and material-saving utility of Wiremold Raceways and fittings are helping war industries. In the plants that produce tanks, guns and planes, other

thousands of feet of Wiremold Raceways and Plugmold Plug-in-anywhere Bench Wiring save time and material in completing installation of urgently needed power and light circuits, and daily contribute to increased production by promoting greater operating efficiency.

Adequate supplies of Wiremold are immediately available from stock for essential industrial installations and for use in equipment for war service. Wiremold Engineers will welcome an opportunity to work with you in developing installation methods adapted to your special requirements. Write direct to The Wiremold Company, Hartford, Connecticut

WIREMOLD



Wiremold No. 1100 Raceway showing typical method of picking up branch circuits with standard Wiremold nipple fittings.

CAN HELP YOU

"HELPING HAND" LITERATURE
FOR CONTRACTORS AND
PLANT OPERATORS

PRODUCE FOR WAR AND PLAN FOR PEACE

- | | |
|---|--|
| <input type="checkbox"/> Bulletin, "Wiremold Industrial System-Wiring Speeds War Production". | <input type="checkbox"/> Engineering Data Sheets No. "3000" System Wiring for Industrial plants. |
| <input type="checkbox"/> Engineering Data Sheets, Plugmold Multi-Outlet Wiring Systems. | <input type="checkbox"/> "Pancake" Wiremold Overfloor Wiring System for Office and factory. |
| <input type="checkbox"/> Wiremold Catalog and Wiring Guide. | |

CHECK and return with your name and address.

Recent W.P.B. order
Drastically Restricts Solder Joints!

No Restrictions on IDEAL Wire-Nuts

Solder-and-tape joints are *prohibited* where another product meeting electrical requirements can be used. IDEAL "Wire-Nuts" meet every requirement for the "other product". "Wire-Nuts" use No Critical Materials—Quickly Applied, Inspected, OK'd. Not a substitute but a *Better Way* of making wire joints!

SAVE CRITICAL MATERIALS

Other IDEAL War-Time Wiring Speeders

- Fish Tape Reels and Pullers
- Wire Strippers
- Joist Borers
- BX Armor Cutter
- Cable Ripper
- Switch Box Supports

**SOLD THROUGH
JOBBERs**

IDEAL "Wire-Nuts" use no Lead, Tin or Rubber as required for solder-and-tape joints. They are immediately available, and help you in your constant efforts to conserve critical materials.

Strip Wires  Screw on  That's All!

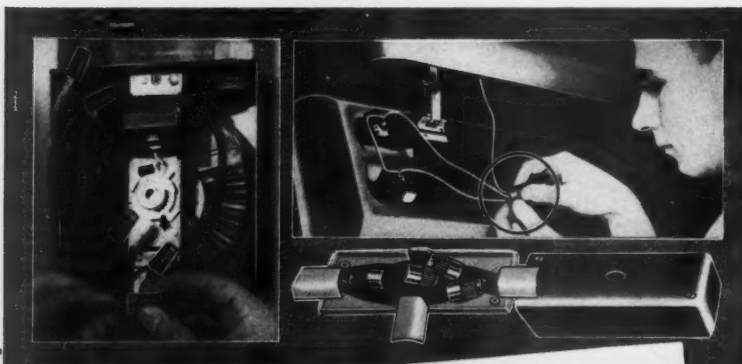
Easier, Quicker to use. Applied cold. No fire hazard—no blow torch or soldering iron needed. Think of the time-saving that means when multiplied by many thousands of wire joints! Rush war-plant jobs can be finished faster. Yet you make a neater, more craftsmanlike job, better electrically, stronger mechanically.

SIZES FOR EVERY JOB. Fully Approved. Listed by Underwriters' Laboratories, Inc. Millions in Use. Write for FREE SAMPLES.

Immediately Available

Unit Heater Installation. "Wire-Nuts" speed up new wiring jobs and simplify changes.

(Upper Illustration) "Wire-Nuts" Speed Up Fluorescent Fixture Installation and Repairs.
(Lower Illustration) "Wire-Nuts" Occupy very little space. Compact and neat.



IDEAL COMMUTATOR DRESSER CO.

1041 PARK AVE., SYCAMORE, ILL. * SALES OFFICES IN PRINCIPAL CITIES

In the News

[FROM PAGE 100]

Lukas-Harold Co.; John R. Matellie, RCA Victor Div., Radio Corp. of America; Ralph Reidy, Eli Lilly & Co.; Al Probst, Allison Engine Co.; and J. P. Ditchman, lighting engineer, General Electric Co., Cleveland, Ohio.

Based on the success of this panel, the Electric League of Indianapolis is planning future meetings of a similar nature and covering subjects of vital interest to the members of their Maintenance Division.

OIL BAN LIFTED FOR V-C PRODUCTION

Under an order from the Petroleum Administration for War, the 40 percent cut in fuel oil rations has been lifted for certain chemical industries where it is used for other than space heating and hot water purposes. Among the chemical products affected is varnished cambric.

ELECTRICAL PERMITS SHOW DECLINE

The steady decline in the number of electrical permits issued by the City of Chicago during the past year follows closely predictions that electrical construction is rapidly nearing an end. With residential and commercial electrical construction practically extinct and new warplant construction rigidly curtailed, prognosticators see a vanishing point about July of this year.

Permits issued in Chicago for the last six months of 1942 totaled 15,158 compared with a total of 24,350 for the first six



WAR BOND BUYING plan of Los Angeles Electrical Contractors Association and Local IBEW is attracting national attention. Men moved between jobs can buy bonds regularly through payroll deductions handled by a joint bureau. Cost of the service is financed by the contractors and the union. Here Samuel Gray, representing the Treasury Dept., receives checks for War Bonds from Gene Gaillac of the union and A. L. Stone head of the contractors group.

Electrical Contracting, March 1943

What are lighting men doing to help SPEED WAR PRODUCTION?

LIGHTING men have a tremendous job to do in speeding up war production. Not so much in the big new bomber plants that started out with good lighting. But in the thousands of small shops and plants newly converted to war work. Most of these plants never had a night shift before. What lighting they had was originally installed only to supplement daylight.

This is a challenge that lighting men are meeting in many ingenious ways. Frequently some very simple, inexpensive changes will work wonders—soap and water on bulbs and reflectors, white paint on walls and ceilings, adding supplementary lighting, rearranging lighting fixtures, getting rid of glare in the eyes of workmen. Here are a few typical examples:



1 The draftsman in a small precision grinding plant that had recently installed fluorescent lighting said the light was good but there were shadows he hadn't noticed with the former filament lighting. A lighting engineer studied the problem and suggested shifting the drafting table with respect to the length of the lamps. This minimized the shadow condition, satisfied the draftsman.



2 A foundry located in a long narrow building used a traveling crane to transport materials from production areas and load them on flat cars. Because the general lighting was poor, night shift workers had difficulty seeing into the flat cars at the loading zones. A lighting engineer solved the problem by suggesting that two 300-watt reflector lamps be installed on the bottom of the crane, thus providing light wherever the crane might be.



4 The fluorescent-lighted inspecting tables of a large war plant were located next to a foundry operation. In service for a year, the fluorescent lighting units had never been cleaned. A lighting engineer showed two plant men how to wash the reflectors and clean the lamps. The cleaning alone tripled the lighting from 7 to 21 footcandles, and the inspectors' job was made easier and more efficient.



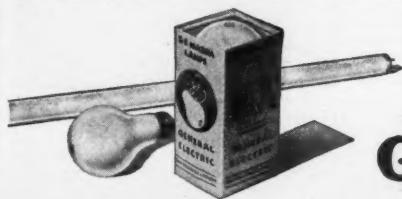
5 Two open type 4-lamp fluorescent fixtures had been installed in the office of a cement manufacturing plant. When a lighting engineer called to make a check-up of the plant lighting, the office executive complained that the glare from the fluorescent lamps was terrific... regardless of how he sat at his desk or turned in his chair. The lighting engineer simply moved the desk so that the glare didn't strike the executive's eyes.

* * *

3 The large size filament lamps required to provide sufficient light in a screw cap company were too big for the RLM reflectors. The resulting glare was hard on workers' eyes. A lighting engineer suggested that silvered bowl lamps be substituted for the regular type lamps so as to improve the shielding angle. Results: with glare eliminated, seeing conditions were improved.



These are a few of the things that wartime lighting men are doing to help war plants keep their lighting at top efficiency twenty-four hours a day. Remember, G-E lighting engineers are ready to work with you to give war factories the better light they need for better protection.



G-E MAZDA LAMPS
GENERAL ELECTRIC

RE-LIGHTING

the new **manpower** *requirement*
production

Vital to plants built and lighted
for daylight operation

Most plants operating today were designed and built for peacetime, *daylight* working schedules. Wartime production demands night work. *Lighting based on daylight conditions is inadequate to serve the needs of night workers.*

Night production is generally acknowledged to be anywhere from 20% to 40% less efficient than daytime production. And poor lighting, with its consequent eyestrain, fatigue, and lower working efficiency, is a major cause of this slump.

Re-lighting for 24-hour-a-day war production is the easiest, most economical remedy for this condition. Re-lighting does not mean discarding your present lighting system. It merely means bringing the equipment you have up to date by re-locating lamps to eliminate glare and shadow; increasing lamp wattages, re-spacing lamps, installing additional equipment to insure uniform lighting levels throughout your plant. A Silv-A-King lighting engineer can tell you exactly.

Silv-A-King's part in the war effort includes the production of parts for torpedoes, bombs, gliders and other aircraft; as well as naval and surgical equipment.

BRIGHT LIGHT REFLECTOR COMPANY, INC.

1033 Metropolitan Avenue, Brooklyn, N. Y.



Send for your copy of our
16-page book: "Light Is An Essential
Production Tool"



SILV-A-KING MAKES *Light* WORK FOR YOU

In the News

[FROM PAEG 102]

months of that year. The record for January, 1943 shows 1866 permits issued—a drop of approximately 54 percent from the January 1942 total of 4036. The all time low for the Chicago Inspection Bureau was in February 1933, when only 1933 permits went over the counter.

Chicago's month-by-month electrical permit record, from December 1941 through January 1943, covering all types of electrical construction follows:

December 1941	4495
January 1942	4036
February	3676
March	4272
April	4526
May	4077
June	3763
July	3089
August	2765
September	2527
October	2662
November	2108
December	2007
January 1943	1866

MICKA APPOINTED TO STATE BOARD

E. J. Micka, Hibbing, Minn., president of the Minnesota Electrical Council, Inc., was appointed by Governor Stassen of Minnesota to be a member of the State Board of Electricity for a period of five years beginning January 1943. "Ed" brings with him a wealth of electrical experience and industry contacts, having operated electrical shops for the past twenty years at Hibbing, Chisholm and Virginia, Minn.



PLANT ENGINEER, J. A. Drogue, R.C.A. Victor Division, Radio Corp. of America, Indianapolis, led the panel on Electrical Maintenance at the WPB clinic held in that city recently.

Electrical Contracting, March 1943

You can be your own **COMMITTEE OF ONE** on *Safety*

*Every man, woman and child in all America can and should join the greatest counterattack on accidents in all history. Faced with the increasing accidents on the home front, already exceeding those on the fighting front, it's time that unified action be taken to curb the sabotage of man power by accident.

Just one glance at the figures below will convince you of the need for immediate action . . . Since Pearl Harbor, 85,000 persons have been killed by accident in the United States.

And think of it! . . . Over 7,700,000 persons have been injured during that time. This means that about 410,000,000 man-days of work have been lost . . . man-days which might have been spent turning out tanks, planes, guns, ships and a thousand or more other materials of war.

If you say to yourself—"The little I can do won't help"—then nothing will be done, yet the results will be astounding if everyone would merely take these simple steps—

1 Be careful yourself. Never take risks, on the job or off the job.

2 Caution everyone with whom you come in contact . . . to be careful.

3 Drive your car slowly and *always* keep it under control.

4 In your business, constantly suggest new ways of promoting safety.

5 In your home, caution every member of your family against taking risks.

6 Be sure that you heed every caution and danger sign you see.

**7 DON'T GET HURT. DON'T DO ANY-
THING THAT MIGHT INJURE OTHERS!**

**This message is published for the National Safety Council by the*

H. H. ROBERTSON COMPANY
Pittsburgh, Pennsylvania

HOMES
will be
air-minded
too!



Long before the war, ventilation was becoming more than a matter of opening and closing a window. It is inevitable then that truly modern ventilation will be expected and demanded in the homes that will be your post war business. The time has not yet come when we can show you a picture and say — "this is the ventilator of the future". We can assure you, as the largest producers of electrical home ventilators, that the name "V-Line" will represent the best for homes of every size and cost.



For an air-minded
nation — V-Line
ventilation.

Buy War Bonds
and Stamps

VICTOR ELECTRIC PRODUCTS, Inc.
3250 Robertson Rd. Cincinnati, Ohio

Uptegraff
TRANS FORMERS

QUALITY



SERVICE

TRANSFORMERS

Tell us your needs in Transformers. Designed and built specially for your particular requirements in strict accordance with the applicable standards of AIEE, EEI, and NEMA. Types and sizes and up to 10,000 KVA, 69,000 volts.

You will find here an organization splendidly equipped to work with Electrical Contractors, and to assure "Quality and Service" on every Transformer installation.

Tell us your requirements, and write for Uptegraff Bulletins.

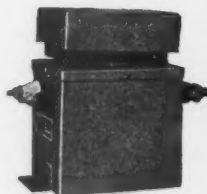
Send for Special Bulletins, and let us quote on your Transformer requirements.



Type E, entirely enclosed; adaptable to indoor or outdoor service. Built in sizes up to 5 KVA.



Uptegraff type CSP. Completely Self-Protected Distribution Transformer.



Indoor Potential Transformer with Primary Fuses

R.E. UPTEGRAFF Manufacturing Co.
SCOTSDALE • • • PENN'A • U.S.A.

In the News

[FROM PAGE 104]

Mr. Micka succeeds James M. Whalen who, after 20 years of service on that group, has retired to continue his usual activities as president of the Commonwealth Electric Co., St. Paul, Minn. During his service on the State Board, Mr. Whalen has witnessed the development of the Minnesota State licensing law into one of the most workable and best administered laws of its kind in any state in the Union.

REPAIR PRICING SERVICE LAUNCHED

A new price and cost service has been established by A. S. Vaughn of Chicago. The Price Book of the Vaughn Pricing Service is designed to aid the motor dealer and his sales staff providing a basis for estimating and quoting on new and rebuilt apparatus or repairs.

The scope of the price service covers all types of d.c. and a.c. motors and related electrical and mechanical repairs. Vaughn is widely known in the motor shop field and the price book material is drawn from data and experience of many years with the costing and pricing problems of motor shops and dealers.

MALONEY HEADS CHICAGO ELECTRIC ASSOCIATION

C. J. Maloney, District Manager of Cutler-Hammer, Inc., was recently elected president of the Electric Association, Chicago. "Pat", as he is familiarly known in the industry, has represented his company in the Electric Association for many years



EMERGENCY KINKS to keep essential machines operating are in a bag of tricks that John R. Matellie, Chief Electrician, R.C.A. Victor Division, Radio Corporation of America, Indianapolis, keeps handy.

Electrical Contracting, March 1943

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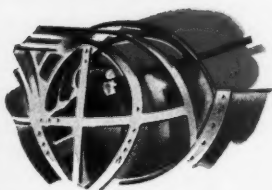
SERVING THE ARMED FORCES



"... This award is your nation's tribute to your patriotism and to your great work in backing up our soldiers on the fighting front."

Robert P. Patterson
Under Secretary of War

EMERSON-ELECTRIC War Products



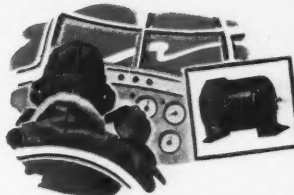
POWER-OPERATED AIRPLANE GUN TURRETS

These heavy-caliber fire power, armored turrets protect our Army-Navy Bombers and Torpedo planes against enemy fighter aircraft.



PARTS FOR ARTILLERY AMMUNITION

Precision-built shell bodies and boosters for U. S. Artillery are contributing to the offensive power of our armed forces.



ELECTRIC-MOTOR CONTROLS FOR AIRCRAFT

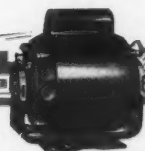
The fighting power and split-second maneuvering of modern war planes depend upon precision-built electric motor controls.

AFTER VICTORY... Back To The Job Of Serving The Nation



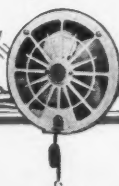
ELECTRIC FANS

The most complete selection of quality Fans in America, with the famous 5-Year Guarantee, inaugurated in 1914.



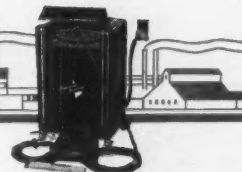
ELECTRIC MOTORS

For household, farm, commercial and industrial appliances and labor saving machines. ... Also, for aircraft controls.



VENTILATING EQUIPMENT

Kitchen ventilating and attic cooler fans for homes. Exhaust and ventilating fans for industry and commerce.



A. C. ARC WELDERS

The most modern of metal fabricating methods is made universally available through these compact, portable units.

EMERSON ELECTRIC

THE EMERSON ELECTRIC MANUFACTURING COMPANY, SAINT LOUIS ... Branches, New York - Detroit - Chicago - Los Angeles - Davenport



Simplex Insulated Wires and Cables must conform to war-time regulations now and "for the duration" but they retain the properties necessary for satisfactory service.

Into them we are putting the accumulated "know-how" of nearly sixty years devoted exclusively to making wires and cables with rubber, varnished cambric, impregnated paper and plastic insulations.

Shortages of many of the materials normally used in insulated wires and cables have seriously upset production schedules but expert use of what is available is breaking production bottle-necks caused by restrictions designed to conserve and control "critical materials."

The background of knowledge and skill built up during more than a half century now enables us to make the most of the limited materials we can get.

If you are doing essential, high priority war work and must have new cables we shall be glad to tell you more about Simplex cables and what they can do for you.

Simplex WIRES and CABLES

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge, Mass.



TAL'S Prestal HYDRAULIC PORTABLE

PIPE BENDER

- NO HEATING
- NO FILLING
- NO KINKS
- NO WRINKLES

BENDS IRON AND STEEL PIPE OF 3/8" TO 4 1/2" IN ONE SINGLE SIMPLE OPERATION IN ONLY A FEW MINUTES WITHOUT MOVING THE PIPE

UNIFORMITY OF BENDS: The last bend is identical to the first, even if made by "green hands".

PORTABILITY: Pipe can be bent at the point of repair or installation. Few seconds to mount and dismount.

SAVES CRITICAL MATERIAL AND LABOR: Eliminates numerous elbows, fittings, thread cutting, etc. Fastest portable bender!

ADAPTABILITY: Quick changeover to various pipe sizes.

SMOOTHNESS OF BENDS:
No wrinkles--no kinks--no fracture of pipe due to scientific development of bending formers. No job too complicated.

Obtainable in three different sizes
Meets U. S. Navy, Army & Maritime Comm. Specifications
Write today for circular giving complete description

TAL'S PRESTAL BENDER, INC.

Dept. E3 Milwaukee, Wisconsin



In the News

[FROM PAGE 106]

and has served several terms as a Director for the Manufacturer Group and acted as Chairman of the Industrial Sections Committee since 1940.

Other officers include: treasurer, Fred T. Whiting, Northwestern District Manager, Westinghouse Electric & Mfg. Co.; and secretary, A. A. Gray.

Among the electrical contractors' representatives on the Board of Directors are: William McGuineas, United Electrical Construction Co.; J. Norman Pierce, Pierce Electric Company; F. S. Berry, Berry & Company; and Theodore Osberg, Riverside Electric Company.

CAMPAIGN TO SWING TO MAINTENANCE WORK

Electrical Insurance Trustees, the Insurance Board of the Electrical Contractors Association of City of Chicago and Local 134, I.B.E.W., is taking steps now to forestall hardship among the union employees of its members when new electrical construction work drops off. The initial salvo of the E.I.T. campaign to stabilize employment among union electricians consists of a series of six advertisements in local newspapers suggesting that members of the building and construction trades unions consider the possibility of switching from the purely construction side of building to maintenance of equipment.

Back in 1930, Electrical Insurance Trustees was organized to maintain a sufficient reserve of trained electricians, in good standing with the union, to form the nucleus of efficient construction crews when electrical construction again hit its normal stride. E.I.T. procures group life and total disability insurance for members' employees; maintains a system of unemployment



CAPT. G. P. KRAKER, U.S.N., inspector of ordnance in charge, Naval Ordnance Plant, Indianapolis, Ind., told representatives of war industries at a WPB Production Clinic that "Tomorrow's front line victories begin on the home production front today."

Director
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ors are:
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Berry,
Osberg,

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INSTALL THIS COMPLETE INSULATION AND PROTECTION... *from Entrance Switch TO THE LAST* OUTLET ON THE SYSTEM....

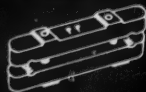
PORCELAIN *Protected* WIRING SYSTEMS

Get

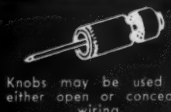
**DURABILITY
SIMPLICITY OF INSTALLATION...
ECONOMY... FUTURE DEPENDABILITY
AND CONSERVE CRITICAL MATERIALS**



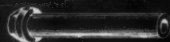
Only these few simple materials are required for roughing in Porcelain Protected Wiring.



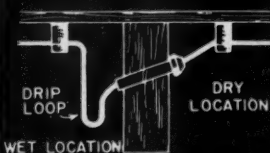
Cleats are ideal for open wiring in dry, damp, or wet locations.



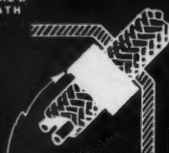
Knobs may be used for either open or concealed wiring.



Tubes insure safety when a wire must be passed through timber or other combustible material.

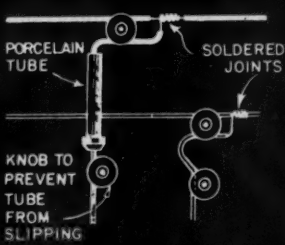


Proved dependable construction in passing from dry into wet location.



TAPE COLLAR PREVENTS CABLE FROM BEING PUSHED OUT OF BOX ON OLD WORK

For old work—no connectors to impede installation—install porcelain switch boxes in a jiffy.



Tap construction—note porcelain tube over the tap wire where it crosses main wire.



Showing simplicity of mounting porcelain box. Hanger straps provided with each box.

*** You can depend on Porcelain Protected Wiring not only to conserve critical materials for our victory effort, but also to give you modern, safer, more economical wiring systems. You not only cut time in making the installations but give your customers the assurance of permanency.**

You have full independent control over the electrical characteristics and workmanship of each installation. Electric Porcelain materials are readily adaptable to all conditions encountered on the job. They conform with government directives on wiring construction which require the use of non-metallic wiring products. The companies listed below will be glad to cooperate with you.

MODERN PORCELAIN PROTECTED WIRING SYSTEMS



★ ILLINOIS ELECTRIC PORCELAIN CO.

★ KNOX PORCELAIN CORPORATION

★ PORCELAIN PRODUCTS, INCORPORATED

THIS NAME ON A STARTER



FS-2 for 15 and
20-watt lamps
FS-4 for 30 and
40-watt lamps

Pat. Nos. 2200443-2228210

Listed and approved by Under-
writers' Labs, Inc., and Cana-
dian Engineering Standards
Assoc. Certified by Electrical
Testing Lab., Specification 6.

WHAT IT MEANS

The name "Lloyd" means a starter which is ap-
proved by fixture makers and all who sell fluorescent
lighting equipment the country over. A starter which
starts quickly and more surely **MORE TIMES** because
it is built for longer life.

It brings you an all-time high in fluorescent efficiency.
Keeps peak lighting loads at the peak.

LLOYD NO-BLINK STARTERS

FS-4 NA Stops flickering and blinking of de-
fective or wornout lamps. Operates at full effi-
ciency over a longer time.

LLOYD PRODUCTS COMPANY

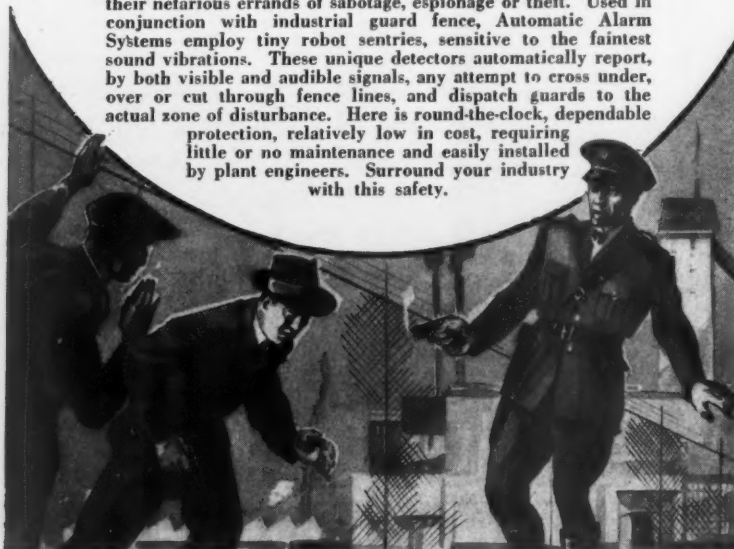
Dept. EC-3

Providence, R. I.

Representatives • Branch Offices • Warehouse Stocks in 23 Leading Cities

TRAPPING 'RATS'

★ The job of A.A.I. Automatic Alarms, America's most
modern method of industrial plant and property protection, is
to trap "rats" ... not after, but **BEFORE** they have accomplished
their nefarious errands of sabotage, espionage or theft. Used in
conjunction with industrial guard fence, Automatic Alarm
Systems employ tiny robot sentries, sensitive to the faintest
sound vibrations. These unique detectors automatically report,
by both visible and audible signals, any attempt to cross under,
over or cut through fence lines, and dispatch guards to the
actual zone of disturbance. Here is round-the-clock, dependable
protection, relatively low in cost, requiring
little or no maintenance and easily installed
by plant engineers. Surround your industry
with this safety.



Write for
Literature



Licensed under DuPont
and Astatic Patents

SALES OFFICES,
Philadelphia, Chicago,
Pittsburgh, Detroit, Tulsa,
and Toronto, Canada

AUTOMATIC ALARMS Incorporated
845 MARKET ST. YOUNGSTOWN, OHIO, U. S. A.

In the News

[FROM PAGE 108]

assistance; advances loans to union mem-
bers; and maintains a system of old age
pensions. Local 134, I.B.E.W., the sec-
ond party to the insurance agreement
effected an arrangement at that time to
reduce the wage scale to enable their mem-
bers to take maintenance jobs. The plan
worked so well that by 1937, when con-
struction again was on the up, there were
enough skilled electricians in the fold to
enable contractors to efficiently handle the
work.

One lesson was learned, however. Em-
ployers were reluctant to hire construction
electricians for maintenance work, at the
maintenance wage scale, while affiliated
trade unions were not operating on a simi-
lar basis. If other building trades had had
a similar stabilization plan at that time
(1930 on), E.I.T. could have placed four
times as many men as it did.

So, the advertisements now appearing
are addressed to "members of Unions af-
filiated with Chicago and Cook County
Building and Construction Trades Council."
The text points out the wisdom of changing
over to maintenance work for the duration;
the advantage of having 300 working days
per year as against the 178 average on
construction work in the past; the vital
need for skilled men to maintain the ma-
chinery and equipment in our war plants,
now operating around the clock; the fact
that the construction trades form the only
available pool of skilled men now; and the
need for swift action to stabilize their em-
ployment status.

Behind all this lies the fond hope that
labor in the building and construction
trades will formulate some type of stabili-
zation plan whereby skilled mechanics, will
find their places keeping the wheels of our
war industries turning. Also, if kept in-
tact, this pool of skilled labor will again
be available when post-war construction
enters the picture.



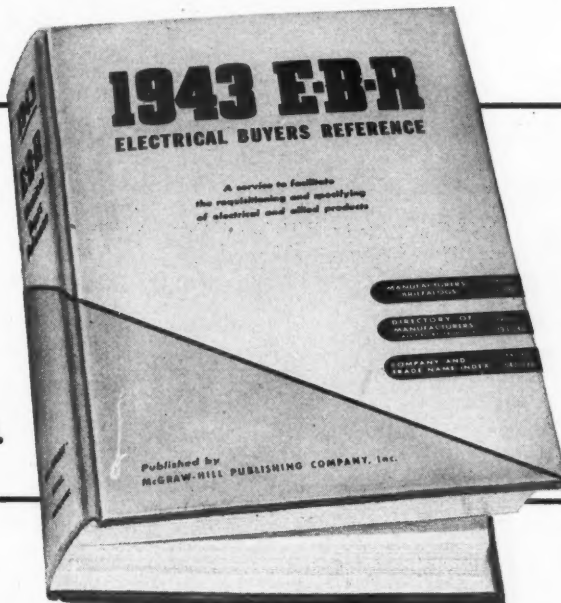
LIGHTING EFFICIENCIES must be
maintained through adequate mainte-
nance and proper application, warns J.P.
Ditchman, G.E. Co., Cleveland, Ohio,
at a recent WPB Production Clinic at
Indianapolis.

Electrical Contracting, March 1943

Your Market Place

FOR ELECTRICAL EQUIPMENT

Here are the products of 290 manufacturers described and classified with more simplicity than a mail order catalog.



It tells you:

What it is.

How it's used.

Who makes it.

Where you can get it.

290
MANUFACTURERS
369
BRIEFALOGS*

To the thousands of electrical men who have written us "thank you" notes after they looked over the 1943 E.B.R., we in turn say "thank you" for the nice things you said about the book.

It means a lot to know that war-busy men find so many practical uses for this storehouse of electrical information. Best of all, we are glad that men in the field have accepted the BRIEFALOG idea.

A manufacturer's BRIEFALOG is a unique help to you—it is a condensed description and specification of his products that enables you to make out an order without having to wade

A WORD OF EXPLANATION

The Electrical Buyers Reference is not sold, and is not offered as a premium for subscriptions to any magazine. It is distributed to a limited number of men who are directly responsible for the specification or requisitioning of substantial amounts of electrical materials.

We have a small reserve supply on which we can draw if a copy is urgently needed by someone directly connected with large-scale war work. Other than that, we regret that we cannot add to our original distribution list.

through dozens of pages of seldom-needed details.

When you need electrical apparatus, supplies, tools or services, turn first to E.B.R. for information. Don't waste valuable time digging through piles of catalogs—the one you want may be lost—or, if you do find it, there's a good chance it is out of date. BRIEFALOGS can't be lost—they are all bound into E.B.R., and they aren't out of date, because all

copy is corrected by the manufacturer before each issue is printed.

Get into the BRIEFALOG habit. It will pay out in time saved.

ELECTRICAL BUYER'S REFERENCE

MCGRAW-HILL PUBLISHING COMPANY • 330 W. 42nd STREET, NEW YORK, N. Y.

READY NOW!

New, Advanced, All-Purpose "MITCHELITE" LINE of Fluorescent Fixtures For WAR INDUSTRY

MEETS LATEST W.P.B.
REQUIREMENTS . . .
Approved to Limitation Or-
der L-78 dated Jan. 31, 1943

Revolutionary MITCHELL Design Brings New Lighting Performance, New Flexibility, New Economy . . .

HERE is the COMPLETE ANSWER to industry's needs for fluorescent lighting that is simpler . . . more flexible . . . more economical to install and maintain!

The new MITCHELITE line retains every good lighting feature of the past . . . and adds important new IMPROVED features that set the pace for the present and future. Nearly a dozen clean-cut advantages enable MITCHELITE fixtures to do a better lighting job than has ever been done before, for less money!

The steel-saving wireway channel design is a complete innovation. A wide range of accessories and fittings make MITCHELITE adaptable for every conceivable method of hanging or mounting . . . to fit every lighting situation in factory, office, or drafting room.

You can get MITCHELITE lighting in four models—each model so flexible it can be used for both individual and continuous row mounting . . . 2-light and 3-light units using 40-watt lamps . . . 2-light unit using 100-watt lamps . . . and a 2-section unit for four 100-watt lamps, which operates with only one ballast.

You've never seen anything like MITCHELITE—the world's finest industrial lighting fixture line!

YOU GET ALL THESE FEATURES

1. **NEW DESIGN and CONSTRUCTION**—Simplicity . . . flexibility . . . superior lighting performance . . . ruggedly built for long service.
2. **NO WASTE STEEL***—Stripped of every useless ounce of steel . . . lighter in weight.
3. **NON-METAL "LUMENITE" REFLECTOR**—Tough and sturdy, moisture and high-heat resistant . . . has highest reflection factor.
4. **NEW-TYPE, EASY-FIT WIREWAY CHANNEL**—Exclusive feature . . . greatly simplifies wiring and mounting for continuous rows.
5. **UNDERWRITERS' LABORATORIES and E. T. L. FLEUR-O-LIER APPROVED**—Bears these labels.
6. **ACCESSORIES FOR EVERY TYPE MOUNTING**—Facilitate surface or suspension mounting.
7. **WPB and U. S. BUREAU OF STANDARDS COMPLIANCE**—Meets governmental requirements.
8. **COOLER OPERATING**—Location of ballast on "outside" results in greater air circulation, cooler operation, longer life of ballast.
9. **EASIER TO INSTALL and SERVICE**—Because of easy-fit wireway channel, new accessories, location of ballast, ready access to starters and sockets.
10. **ADAPTABLE FOR OFFICE and DRAFTING ROOMS**—All fixtures easily convertible for office and drafting room high intensity illumination.

*40-watt units contain less than 3 pounds of steel per fixture.
*100-watt units contain less than 4 pounds of steel per fixture.

Each "MITCHELITE"

Model Can Be Used for Both
Individual and Continuous Row Lighting



... simplified construction of wireway channel and use of easy-fit "Lumenite" enable you to install and to cut in continuous rows quicker than has been possible before.

"MITCHELITE"

Model No. 2075 . . for 2-40 Watt Lamps

Model No. 2076 . . for 3-40 Watt Lamps



"MITCHELITE"

Model No. 2077 . . for 2-100 Watt Lamps



"MITCHELITE"

Model No. 2078 . . for 4-100 Watt Lamps



**2-SECTION UNIT OPERATING
ON ONE "FORLAMP" BALLAST
(For 250-260 Line Voltage)**

**MITCHELL
FLUORESCENT**

GET NEW FREE CATALOG NO. 400

New illustrated MITCHELITE Catalog gives complete details . . . shows mounting methods . . . gives other helpful information. Get your free copy now from your MITCHELL DISTRIBUTOR.



MITCHELL Manufacturing Company
2525 NORTH CLYBOURN AVENUE • CHICAGO, ILLINOIS

KNOW ELECTRICITY AS EXPERTS KNOW IT



-AND GET AN EXPERT'S PAY

What about your future? Who is safe today? Surely not the man who is contented to stand still! Know your job thoroughly—prepare yourself for jobs ahead. To do just this thousands of men have used

The CROFT Library of Practical Electricity

7 Volumes, 2906 pages
1948 how-to-do-it illustrations

● The Croft Library is a complete electrical educator. It is founded on practice—on 20 years of shirt-sleeve experience—on work as it is actually done. It is jammed from cover to cover with the kind of hardheaded facts you want. Written so that the beginner can easily understand it, yet so sound, so thorough, that it is the daily guide of 59,000 highly paid electrical workers and engineers.

● Croft tells you the things you need to know about motors, generators, armatures, commutators, transformers, circuits, switchboards, distribution systems—electrical machinery of every type—illumination in its every phase—the most improved methods of lighting—lamps and lamp effects, etc.—how to do a complete job, from planning it, to completion.

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Fill in and mail the coupon below and we will send you the entire set of seven volumes for ten days examination on approval. We will take all the risk—you assume no obligation. If you decide to keep the books, send \$3.00 in ten days and the balance at the rate of \$3.00 a month.

SEND THE COUPON NOW AND SEE THE BOOKS FOR YOURSELF

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330 W. 42nd St., New York

You may send me the seven volumes of the Croft Library of Practical Electricity for 10 days' examination. I agree to return the books, postpaid, in ten days or remit \$3.00 then and \$3.00 a month until the special price of \$18.00 has been paid.
(To insure prompt shipment, write plainly and fill in all lines.)

Name

Home Address

City and State

Position

Name of Company.....R.C. 3-43

In the News

[FROM PAGE 110]

HIRING PLAN EXPLAINED

Paul V. McNutt, War Manpower Chairman, has issued a statement clarifying the controlled hiring policy adopted by the War Manpower Commission. Thirty-two areas in which controlled hiring plans will be set up have been announced.

Mr. McNutt said that the policy was based on the experience of more than a score of communities which already have employment stabilization agreements.

Wide latitude is given local authorities to set up methods of control that are best adapted to local labor market conditions, and to utilize fully existing private and public hiring channels provided these conform to the standards established in the area employment stabilization plan.

"This program," Mr. McNutt said, "encourages local initiative and cooperative effort in solving manpower problems. Established hiring channels available in the community may continue to operate if they conform to the hiring rules which have been worked out jointly by local government, labor and management, to promote the most effective use of manpower for the war effort.

"Although this policy gives the Regional Directors authority to centralize all hiring through the U. S. Employment Service, we do not expect that this authority will have to be used except in extreme cases," Mr. McNutt explained. "In fact, the policy specifically instructs the Regional and Area Manpower Directors to make the fullest possible use of existing hiring channels and to integrate these into the program for the area.

"In certain shortage occupations, the U. S. Employment Service will be the sole hiring channel. Workers in such shortage occupations are obviously hard to obtain, and therefore much in demand. It is necessary to allocate the limited supply among competing essential demands according to the relative urgency of their needs. Although the U. S. Employment Service will be the sole hiring channel, the local employment office will make full use of other recognized placement channels to insure complete access to all available qualified workers," Mr. McNutt added.

Among the agencies specifically mentioned in the policy as eligible to participate in controlled hiring plans are private employers, labor organizations, professional organizations, schools, colleges, universities, technical institutions and Government agencies.

Under the policy, Regional Directors may initiate plans to control hiring of workers in certain occupations, when this is necessary to avert or relieve threatened shortages of manpower. The occupations to be subject to the plan will be determined in the area. A controlled hiring plan can be established only as part of an over-all manpower or employment stabilization program in the area.

The Management-Labor War Manpower Committees in the regions and areas will have considerable influence in determining the nature of the local programs. Regional and Area Manpower Directors are instructed to consult with these committees on the policies, standards and safeguards to be incorporated in the hiring plans. Each plan must also provide for appeals machinery and procedures which will assure a fair hearing for any worker, employer, or other person who feels that the plan has affected him unreasonably or unfairly.

While the plans will differ widely from area to area, all of them must observe the following hiring policies.

1. Workers are to be referred to jobs which will utilize their skills most effectively in the war effort;

2. Priority in referring workers shall be given to employers engaged in essential activities, in the order of the urgency of their activities, provided their labor needs cannot be met by more effective utilization of workers already employed in their plants;

3. A worker whose present or most recent job has been in an essential activity can be hired only for work in another essential activity, and then only when the worker has a statement of availability from his latest employer or from the War Manpower Commission.

4. Hiring and referral of workers shall be based on occupational qualifications essential for the performance of the job and without discrimination on account of race, color, creed, sex, or national origin, except as required by laws relating to citizenship.

5. Insofar as it will not interfere with the effective prosecution of the war effort, no worker will be required to accept or keep a job which is not suitable, and no employer will be required to retain a worker who is incompetent or who fails to conform to reasonable shop rules or standards of conduct.

The policy suggests that very small firms—manufacturing firms with less than eight employees and non-manufacturing



DEFENSE LIGHTING—Capt. George J. Stockly, Internal Security Division, Second Service Command of the U. S. Army; Major R. P. Breckenridge, Corps of Engineers, Camouflage Branch, U. S. Army and S. G. Hibben, Director of Applied Lighting of the Westinghouse Lamp Division, discuss some of the technical problems involved in defense lighting at the recent conference of the A.I.E.E. in New York City.

The Red Cross has Problems like your own

—of Planning

Your Red Cross operates a vast planning program to enable it to be ready for any disaster or emergency anywhere—whether it comes in the Americas, Europe, Australia, Asia, or Africa.

—of Organization

Your Red Cross is responsible for the smooth operation of 3,750 chapters and 6,000 branches, all engaged in the same enterprise of helping all who need help.

—of Personnel

Your Red Cross has tripled its staff since Pearl Harbor and has had to enlist the aid of and train over 6,000,000 volunteers in the principles of First Aid, Water Safety, Accident Prevention, Home Nursing, Nutrition, Nurse's Aideing, Mass Feeding, Motor Mechanics, and other subjects allied to our country's war effort.

—of Production

Your Red Cross is not only one of the world's foremost purchasers of supplies, but it has the immense distribution job of collecting millions of items from 10,000 different communities in the United States, assembling and storing them, and then shipping them to practically every country in the world. Last year your Red Cross shipped some \$60,000,000 worth of food, clothing, and medical supplies to over 20,000,000 homeless people in foreign countries.

—of Finance

Your Red Cross, whose war-time and post-war expenses will run well into hundreds of millions, must account to the public for every penny it collects and puts to work. Its accounts are audited annually by the U.S. War Department.

The Red Cross faces the same problems as are in your business. With your support it can successfully meet them.

The Second War Fund is greater than the First, but no greater than the increased needs.

Business men can help with time and with money, as organizations and as individuals.

March is the Red Cross month... Cooperate with your Red Cross Chapter.

Your Dollars help  make possible the
AMERICAN RED CROSS

RESISTORS ON 24-HOUR WATCH



Electrical equipment aboard ship has no off-duty time. Resistors in control circuits must be dependable to function at all times. Ward Leonard Vitrohm Resistors measure up to their responsibilities. Their ability to withstand moisture, temperature change, shock and vibration makes them particularly well fitted for general industry as well as for sea duty. Send for data sheets.

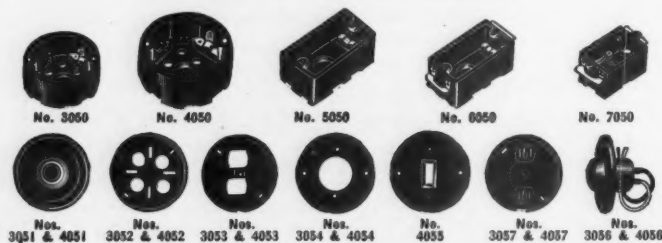
WARD LEONARD

Electric control (WL) devices since 1892.

WARD LEONARD ELECTRIC COMPANY, 28 South St., Mount Vernon, N.Y.

A Complete Line of BAKELITE OUTLET BOXES and COVERS

THAT MEET THE NATIONAL ELECTRICAL CODE AND APPROVED BY
FEDERAL HOUSING ADMINISTRATION
BOXES FURNISHED WITH OR WITHOUT CLAMPS



SAFE • ECONOMICAL • DURABLE • NEAT

The sizes and design, except for clamps and wire knockouts, same as standard metal outlet boxes. They take standard type of fixture studs. Two clamps supplied with each box. The wire clamps hold against 125 lbs. pull. When used with fixture studs they withstand over 400 lbs. pull on stud.

These Bakelite Outlet Boxes have side knockouts and clamps to take 14-2, 14-3, and 12-2 non-metallic sheathed cable, and 14-2, 14-3, 12-2 and 12-3 CNX Type Cable and one 1/2 in. Bottom Knockout.

These covers are sufficiently thick to obviate breakage in installation or use. Standard color Black.

UNION INSULATING COMPANY, INC.

FACTORY:
PARKERSBURG, W. VA.

SALES OFFICE:
27 PARK PLACE, N.Y.C.

In the News

[FROM PAGE 114]

with less than 25—should be excluded from the operation of controlled hiring plans.

The new list of areas in which hiring controls are to be set up are:

Akron, Ohio; Baltimore, Maryland; Bath, Maine; Beaumont, Texas; Bridgeport, Connecticut; Brunswick, Georgia; Buffalo, New York; Charleston, South Carolina; Cheyenne, Wyoming; Dayton, Ohio; Detroit, Michigan; Elkton, Maryland; Hampton Roads, Virginia; Hartford, Connecticut; Las Vegas, Nevada; Macon, Georgia; Manitowoc, Wisconsin; Mobile, Alabama; New Britain, Connecticut; Ogden, Utah; Panama City, Florida; Pascagoula, Mississippi; Portland, Oregon; Portsmouth, New Hampshire; San Diego, California; Seattle, Washington; Somerville, New Jersey; Springfield, Massachusetts; Sterling, Illinois; Washington, D. C.; Waterbury, Connecticut, and Wichita, Kansas.

BOOK REVIEW

The Foreman's Handbook

At a time when many men are being upgraded to supervisory positions, job crews are changing and many new hands must be molded into new routines, this reference manual for foremen fills an acute need.

Edited by Carl Heyel with the assistance of a staff of specialists the book provides an up-to-the-minute reference for the foreman who wants to make the most of his job.

There are eighteen chapters each covering a phase of the foreman's responsibility. Such subjects as leadership, quality control, time study, training new men, safety, etc. are each handled completely in one chapter for ready reference. Yet the logical sequence of subjects makes the work as readable as a novel.

The Foreman's Handbook, edited by Carl Heyel, McGraw-Hill Book Co., 330 West 42d St., New York, \$3.00.



FROM THE BLACK HILLS of South Dakota to the NISA War Conference in Cincinnati, came A. H. Baumgartner, Rapid City, S. D. who is discussing government regulations with (right) W. L. Martin of Ottumwa, Iowa.

Electrical Contracting, March 1943

Priorities

PRIORITY SUSPENDED FOR RATING MISUSE

WPB has ordered all priority assistance suspended for nine months to E. L. Reed, Oakland, Cal., who does business as the United Electric Co. The order states that Reed misused preference ratings extended to him on purchase orders for copper wire to be installed in defense housing projects. A total of 290,000 feet of wire is involved in the case.

FLUORESCENT FIXTURE WEIGHTS CUT

Weight of metal that may be incorporated into fluorescent lighting fixtures for use with hot cathode tubes and bulbs, if manufactured after May 4, 1943, have been restricted to the amounts specified in an amendment to L-78. The exact amounts of metal that may be used will depend on the sizes of lamps and fixtures.

Further curtailment of the use of metal in such fixtures is required by a clause forbidding, with certain exceptions, the use of metal after February 9th in the manufacture of shields, louvers, or baffles for fluorescent lighting units.

The "stop production" order does not apply to shields, louvers, or baffles for fixtures employing a hot or cold cathode tube or bulb when the fixture is designed and built for use in hazardous locations as defined in the National Electrical Code (1940 edition). Neither does it apply to the manufacture or assembly of fluorescent lighting fixtures built for use with a 400-watt or 3000-watt mercury tube or bulb.

Following are permissible weights of metal that may be used in various sizes of lamps and fixtures (exclusive of ballast, hanging or suspension devices):

(1) In fixtures designed and constructed for two or three 40-watt hot cathode tubes or bulbs, not more than three pounds of ferrous metal.

(2) In fixtures designed and constructed for two 100-watt hot cathode tubes or bulbs, not more than four pounds of ferrous metal.

(3) In fixtures designed and constructed for two or three continuous parallel rows of 40-watt hot cathode tubes or bulbs, not more than three and one-half pounds of ferrous metal for each four linear feet of fluorescent lighting fixture.

(4) In fixtures designed and constructed for two parallel continuous rows of 100-watt hot cathode tubes or bulbs, not more than four and one-half pounds of ferrous metal for each five linear feet of fluorescent lighting fixture.

The Building Materials Division, War Production Board, estimates that four thousand tons of metal per year will be saved by the new restrictions.

The definition of "industrial fluorescent



Federal

Sealed Arc

SAFETY FACTORS

PREVENT PRODUCTION SLOWDOWNS

Switch failures slow up production. That's why Federal "Sealed Arc" Safety Switches* are built with extra safety factors to insure continuous, dependable, trouble-free operation on essential circuits. Federal's "Sealed Arc" construction, for instance, is a confining porcelain "straightjacket" with ribbed arcing chutes that break up and snuff the arc before it can do damage.

Other safety factors that are making Federal switches "musts" with more and more manufacturers are:—dead front shields over live parts, high grade insulating material throughout, ample spacing between live and grounded parts, unobstructed wiring, rugged construction to insure permanent alignment of working parts, and patented "grip-tite" fuse clamps for better connections. Follow the leaders—for extra service and safety switch to Federal!

* "Sealed Arc" construction up to 200 Amperes.
400 to 1200 Amperes Knife Blade Type.

For Complete Safety Switch Data

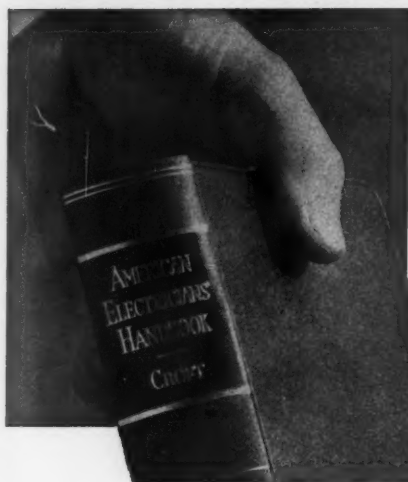
write for Catalog 42. Contains all the essential facts on Types A, C and D Federal "Sealed Arc" Safety Switches.

FEDERAL ELECTRIC PRODUCTS COMPANY

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PANELBOARDS • SWITCHBOARDS • SAFETY SWITCHES • CIRCUIT BREAKERS

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for more efficient
profitable handling of

every type of practical electrical job

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5th Edition—Croft's

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This book is packed from cover to cover with the facts which every man engaged in electrical work needs to have constantly at hand. It gives the information you need in the form in which you can use it. From clear explanation of the fundamentals of electricity to suggestions for remedying the troubles of electrical equipment, the information is the kind that helps practical electrical men—wiremen, contractors, linemen, plant superintendents, operators, construction engineers, and others—to select and install commercial electrical apparatus and materials intelligently for the performance of specific services. It gives the kind of data that will help them operate electrical equipment efficiently and to maintain it at high operating efficiency.

Revised by
CLIFFORD C. CARR

Head of Electrical Engineering Department,
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1600 pages of

practical data, helpful pointers, explanatory illustrations and diagrams, useful rules, recommendations, and short cuts, and much descriptive information on modern electrical practice. 527½, 1177 illustrations, price only

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Hundreds of facts condensed and classified for quick, easy use—Use this Handbook to check your methods for quick answers to troublesome problems, as a dependable reference and study guide of electrical fundamentals, equipment, and materials, and their application.

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- simple instructions for calculating load on circuits, and for selecting proper wire size to meet voltage drop and current carrying capacity conditions.
- entirely new division to aid in selection and specification of switching, protective, capacitor, and wiring-device equipment, estimation of space requirements for switchboards, care and operation of batteries, etc.
- practical data on operation, care, installation, and selection of motors and control equipment, including information on planning of motor circuits and drives.
- helps on installation, care, and proper loading of transformers
- practical information on construction methods and materials in outside distribution
- details of all types of interior wiring; developments in light sources and luminaire equipment; etc.
- new section of 64 handy wiring tables, conveniently arranged

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City and State
Position
Company EC. 3-43

In the News

[FROM PAGE 117]

lighting fixture" is amended by insertion of a clarifying clause which states that "for the purpose of this order an office or a drafting room is not an area in which manufacturing, assembling or other industrial functions are performed."

Several other minor changes appear in the amendment order but these are merely corrections and clarifications in the text and do not involve any important revisions. The amendment makes no essential change in the provisions relating to disposition of frozen inventories.

WPB EXPLAINS FLUORESCENT INVENTORY

The Lighting and Fixtures Section of the Building Materials Division has recently issued the following statement which is of vital interest to fluorescent dealers and wholesalers:

The Lighting and Fixtures Section, Building Materials Division, presents herein information of interest to electrical wholesalers and other dealers in fluorescent fixtures on the subject of existing inventories of commercial type fluorescent lighting fixtures which have been "blocked" since June 2, 1942, under the L-78 order. The Lighting and Fixtures Section suggests that perhaps manufacturers, wholesalers and dealers are not fully aware of the opportunities which are available in L-78 as amended October 19, 1942.

Freer movement of the fixture inventory is afforded by the applicability of the B-2 rating since this rating in effect specifically directs the holder of a rating to purchase his fixtures from the inventory. It should be emphasized that the B-2 does not in itself mean that this rating will be given indiscriminately to applicants for fluorescent fixtures from "frozen" inven-



RALPH REIDY, Foreman of the Electrical Shop at Eli Lilly and Company, Indianapolis, took a night off to relate his experiences to fellow maintenance men at an Indianapolis Maintenance Clinic.

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1943



TENNESSEE DELEGATES to the NISA War Conference included (L to R) S. U. Steffner and J. F. Steffner, Chattanooga Armature Works; M. G. Miller, Tennessee Electric Motor Service, Knoxville; and J. H. Westcott, Chattanooga Armature Works.

tories. In keeping with the necessity for using these fixtures in war work, ratings will be assigned only for use in offices, training schools, institutions, where the work done is a part of the war program. Active interest in the assignment of the B-2 rating is being developed in conferences with interested branches of the War Production Board and with procurement offices of the armed services. Copies of lists with the names and addresses of holders of the fixture inventory are being circulated to many applicants for lighting equipment.

To successfully bring together the purchaser and the supplier, there is a need for detailed description of the fixtures remaining on hand, together with up-to-date listing of the number and sizes. Also, the initial inventory did not give much in the way of fixture descriptions. There is, therefore, a real need for a continuous flow of up-to-date information in a form which can easily be used by a prospective purchaser. The Lighting and Fixtures Section in Washington is often in a position to pass information along.

If manufacturers, wholesalers and dealers who have stocks of commercial fluorescent fixtures wish to report these inventories to the War Production Board, it is suggested that letters be addressed to the Lighting and Fixtures Section, 470 Indiana Avenue, Washington, D. C. and that the inventory information include the following data: The number of commercial fluorescent fixtures employing 40-watt or larger lamps with such number broken down according to number and size of lamps employed, ceiling or suspension type, manufacturer's catalog numbers if available, shielded or unshielded types.

Under Section (3), "Sale and Delivery," of the order, opportunity is provided for free interchange of fixtures from one manufacturer, wholesaler or dealer to another manufacturer, wholesaler or dealer and so on, provided only that each party to such a transaction is regularly in the business of selling fluorescent lighting fixtures. This means that a supplier who is located in a non-industrial area where the demand for fluorescent lighting fixtures for lighting of industrial offices would always be slow, may find the opportunity to trans-



...are stepping up war production

Round the clock production would be totally impossible without continuously dependable electric lamps.

That's why the makers of Champion Lamps are exerting every ounce of effort to keep on providing lamps that live up to the Champion Diamond's four points:

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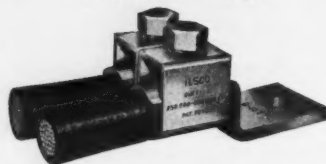
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Two sizes:
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Simple in design, efficient in construction, dependable in operation. Ample contact area for sustained overloads. No special tools required. Neat installation.

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ILSCO COPPER TUBE & PRODUCTS, Inc.
CINCINNATI, OHIO

In the News

[FROM PAGE 119]

fer his fixtures to a supplier located in an active area whose stock may need replenishing. It also means that any supplier receiving an order bearing a B-2 or better preference rating, if he does not himself have a sufficient fixture supply to fill the order, may draw on other suppliers in his neighborhood to get the required number of fixtures.

As a further help to fluorescent lighting fixture dealers, announcement is made of the Reconstruction Finance Corporation's official plan for financial assistance to dealers in fluorescent lighting fixtures "blocked" as of June 2 by the L-78 order. Information about this plan may be obtained from the District Offices of the Reconstruction Finance Corporation.

ELEVATOR EQUIPMENT RESTRICTED

Closer control over the manufacture of elevators and elevator parts, equipment and accessories is established by an amendment to General Conservation order L-89.

The amended order places all types of elevators in the category of "restricted orders" by re-defining the term "elevator" to cover all kinds including hydraulic, hydro-electric and hand-power elevators, dumbwaiters, home-lifts, and elevettes; but excluding mine material hoists and portable elevators. The term also includes inclinators, and electrically operated passenger-elevating devices used in connection with stationary stairways.

A "restricted order" means any purchase order for a new elevator, for material to change the method of operation or control of any elevator, or for parts, equipment, or accessories of any kind to be used in any existing elevator.

The limitations and restrictions do not apply to any order for maintenance and repair parts in an aggregate amount not exceeding \$500 for any single elevator to be repaired or maintained, or for repair parts in any amount for any elevator when, and only when, there has been an actual breakdown or suspension of operations of the elevator because of the necessity for repair and the essential repair parts are not otherwise available. As used in this paragraph "maintenance" means the upkeep of an elevator or elevator structure in sound working condition; and "repair" means the restoration, without change of design, of any portion of an elevator or elevator structure to sound working condition, when such portion has been rendered inoperative or unsafe or unfit for service by wear and tear, damage, destruction or failure of parts or other similar causes.

Changes designed to increase conservation of materials, and to facilitate minor repairs are:

Parts, equipment or accessories aggregating \$25 or less for a single elevator are exempted from the limitations and restric-



MOTOR-START Capacitors

● It's easy to service electric refrigerators with Aerovox motor-starting capacitor replacements. An up-to-date listing tells you what exact-duplicate or universal type to use for every standard type of motor. And the local Aerovox jobber stocks them for your convenience. See him. Or write us.

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SAFETY RULES call for that EXTRA precaution and additional RECHECK which SAFE-T-GLOW provides. Detects accidental tie-ins, crossovers, leakages and induced voltages . . . prevents serious injury and loss of life. SAFE-T-GLOW consists of a sensitive Neon tube, amplified by mirror reflector.

Model A for circuits 2,000 to 35,000 volts.
Model B for circuits from 35,000 to 220,000 volts.

TEST-O-LITE

**Tests Everything Electrical
from 100 to 550 Volts**

Equipped with Neon light which tells instantly where trouble lies in circuits, fuses, cut-outs, motors, etc. Indicates hot or grounded wires. Tells AC from DC. SAVES PRECIOUS TIME. Has PATENTED safety features. Vest pocket size with clip. Lifetime guarantee. List Price \$1.50 at leading jobbers.

L. S. BRACH Mfg. Corp.
55-63 Dickerson St. Newark, N. J.

tions of the orders. Also exempted are elevators or parts, equipment or accessories to be installed and used aboard any ship owned or operated by the Army, Navy, Maritime Commission or War Shipping Administration.

Additional restrictions on the use of non-ferrous metals and steel are imposed to include hanger cover plates, passenger cabs (not including gates or doors), freight elevator side guards and car gates. Essential hardware, however, is exempted.

Under the terms of the order, the Director General may at any time prescribe a production or delivery schedule for any manufacturer of elevators; direct the delivery of any elevator or elevator parts, equipment or accessories in production or completed; or direct the cancellation of any order held by a manufacturer.

LINE EXTENSION PLAN ANNOUNCED

The War Production Board has announced a plan for expediting construction of urgent rural electric extensions in connection with the Government's food production program. A procedure has been adopted to release certain types of copper conductor from frozen stocks for a temporary period ending April 1, 1943 for constructing rural extensions already authorized under Supplementary Order P-46-c.

P-46-c was issued by the War Production Board on January 20, 1943, to permit short rural extensions along existing rural lines as a means of relieving the farm labor shortage and increasing food production. In accordance with long settled War Production Board policy, the order stipulated that the new construction must be with steel wire. Since the spring of 1942, the War Production Board has prohibited the use of copper conductor for electric extensions where steel could be used as a substitute. Stocks of copper have thus been conserved for purposes which can only be served by copper.

Arrangements have now been worked to make additional supplies of steel wire available for rural extensions. However, pending



MAINTENANCE EXPERT, John H. Ferguson, Plant Electrical Engineer, Lukas-Harold Corp., Indianapolis, added considerable weight to electrical maintenance problem discussion at a recent Indianapolis WPB Clinic.

IT PAYS TO TAKE CARE OF TOOLS—

*this book tells
you how*



Caring for tools has always been good business—now it is a patriotic duty. For it takes tools to win a war. Mechanized armies need hand tools in such quantities that even with doubled and redoubled production, American tool manufacturers have few left for use at home.

To assist linemen, electricians and other who use tools to care for their equipment, we have prepared a handbook full of practical suggestions on making tools last longer—or using them with greater safety.

A copy of this book will be sent anyone interested. It is our contribution to help lengthen the life of tools and equipment.

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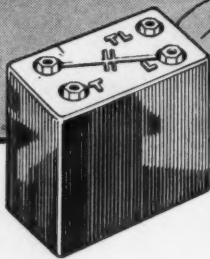
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This booklet on the proper care of tools and suggestions for their safe use will be sent on request to anyone interested. Mail the coupon.

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When you standardize on Mallory Universal AC Capacitors, you can meet any capacitor requirement with fewer types on your stock shelves. That's because Mallory Capacitors are truly universal—they do double or triple duty.

You can get complete details from one of the offices listed here—or write for the IWI Blue Catalog.

INSULATION and WIRES, Inc.



2127 Pine Street
St. Louis, Missouri

In the News

[FROM PAGE 121]

arrival of steel wire from wire mills, a limited amount of frozen copper stocks in the hands of utilities will be released at once, to permit construction of urgent extensions which can be undertaken immediately. The procedure is applicable alike to private utilities and public cooperatives. Releases of copper will be made upon the basis of individual applications in the case of each extension. It will be necessary for the application to certify that the extension complies with the standards of P-46-c, and to state the amount of conductor required and the reasons why construction should not be deferred pending shipment of steel wire.

In the case of REA Cooperatives, distribution of the steel wire is being coordinated by the REA in accordance with arrangements worked out between the War Production Board and that organization.

—WITH THE—
Manufacturers

Beaver Pipe Tools Elects Officers

At a recent meeting of the Board of Directors, a number of changes were made in the list of top operating officials of Beaver Pipe Tools, Inc., Warren, Ohio.

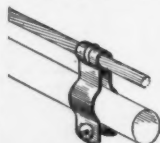
W. A. Neracher, founder of the company and president, was elected to a newly-created position as chairman of the board. W. A. Phillis, formerly vice-president, became president and general manager; M. W. Bechtel, executive vice-president and treasurer; C. W. Shafer, vice-president, Manufacturing; E. R. Barkley, vice-president, Sales and R. C. Mellinger, vice-president, Accounting.

The Fostoria Pressed Steel Corporation, Fostoria, Ohio, announces two new additions to its sales department. W. S. Crandall has been placed in charge of all near infra-red equipment activities. Mr. Crandall has been associated with the company as western division manager and director of engineering. In charge of all lighting equipment activities is Lawrence Goble, who for the past 12 years has been with the Indiana Service Corporation.

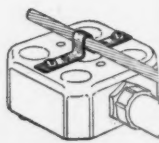
The American Steel & Wire Co., Cleveland, has appointed Charles H. Eisenhardt assistant manager of the electrical, wire rope and construction materials sales division.

MINERALLAC New Practical Unit to Cut Installation Time

● The "Messenger Hanger" and the "Messenger Strap" fill the need for an economical, practical, time-saving unit for use with the new messenger cable type of installation. Mechanically strong, durable, lightweight. They save considerable material and are easily and quickly installed. Our bulletin gives full and complete details—send for it. See your Jobber.



"Messenger Hanger" for Conduit and Cable



"Messenger Strap" for Outlet Boxes

**MINERALLAC
ELECTRIC COMPANY**
New York City Office 50 CHURCH ST.
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25 N. Peoria St. Chicago



DUPLEX LUGS

Cat. Nos. 1601-1615—Square end—one or two attaching bolt holes. Accurately machined all contact surfaces parallel. Receives two or more conductors of different sizes with equal pressure. Wire sizes 4 to 900,000CM.

FLEXIBLE CABLE CLAMP LUGS



Cat. Nos. 1950-1974—Two or four bolts, designed to meet requirements where a single lug adequately applies to several size conductors. Cover range of wire sizes from 1 to 2,000,000CM solid or stranded.

PRESSURE TYPE CAST CLAMP TERMINAL LUGS



Cat. Nos. 400-449—One or two bolt holes. Lugs one piece designed for one wire size to give conductivity and contact surface equal to capacity of wire. All contact surfaces ground, faces parallel, wire sockets machined. Wire sizes 2 to 2,000,000CM.

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The Copperweld Steel Company an-
nounces the consolidation of its former
southwestern and southeastern districts
into a new southern district under the su-
pervision of E. B. Patterson, southern sales
manager, with offices at 1403 Sterick
Building, Memphis, Tenn. The new district
comprises the states of New Mexico, Texas,
Oklahoma, Louisiana, Arkansas, Tennessee,
Mississippi, Alabama, Georgia, North
Carolina, South Carolina and Florida.

Southern district branch offices will be
maintained at 508 Southland Life Building
Annex, Dallas, Texas, and the Rhodes-
Haverty Building, Atlanta, Ga.

In addition to Mr. Patterson, Copper-
weld is represented in the south by Donald
White, Memphis; L. E. Johnson, Dallas,
and M. C. Welch, Atlanta.

The Steel and Tubes Division of
Republic Steel Corporation has named I. H.
Anderson as district manager of sales in
New York. He succeeds L. M. Hogan who
resigned.

Westinghouse Electric and Manufac-
uring Company has named John J. Fiske
as electronic control specialist in the Los
Angeles area.

Spang Chalfant, Inc., Pittsburgh, Pa.,
announces the appointment of M. B.
Squires as assistant manager of conduit
sales.

The Trumbull Electric Mfg. Company
of Plainville, Conn., announces that as
of March 1st William A. Edwards was
transferred from the Boston territory,
where he has been a field representative
for the past two years, to take up his
duties as district manager of a newly
defined Central Southwest District. Mr.
Edwards' headquarters is 3560 Broad-
way, Kansas City.

More Gossip

And We Complain

Complaints about a little snow and zero
weather somewhat tickle Hatfield Electric
Co., Indianapolis electrical contractors, who
are doing work up in Alaska where the
weather is really something to write home
about.

Their men are installing 110 miles of
communication lines from Skagway, Alaska
to Whitehorse in the Yukon Territory—
just off the new Alcan Highway. Main
headquarters are at Edmonton, Alberta.

Latest reports from their outpost show
snow, six to eight feet; temperature, 65 de-
grees below zero. It's no picnic for the
men on the project, a number of whom
come from Indianapolis and Minneapolis
and surrounding areas.

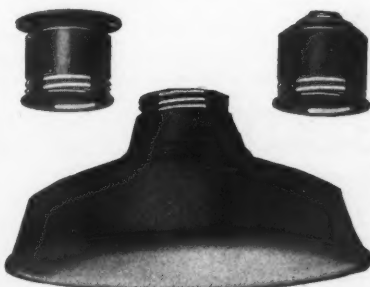
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DEFENSE WORK BRINGS NEED FOR ADDITIONAL LIGHTING INSTALLATIONS



★ QUAD Lighting Units with the RLM
label fill all high intensity requirements
made necessary by Victory manufac-
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the war program demands more and more lighting in-
stallations. The QUAD line has the right unit for the
need—usual, unusual, indoor, outdoor, incandescent,
fluorescent, and mercury vapor. Get acquainted with
this complete line of industrial and commercial lighting
units.



No. 1184-M
RLM THREADED
DOME REFLECTOR



ADJUSTABLE PORCELAIN
ENAMELED FLOODLIGHT

QUADRANGLE MFG. COMPANY

Mfrs. of Incandescent and Fluorescent Lighting Equipment
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**INDUSTRY Needs
GOOD LIGHTING
TO KEEP THE
WHEELS TURNING**

MULTI INCANDESCENT REFLECTORS

• The first step toward good lighting is to install MULTI Incandescent Reflectors. Then, for better performance and lower lighting costs they should be inspected regularly and frequently. Dust and dirt can reduce illumination as much as 50%, if allowed to accumulate on the reflecting side. Incandescent lighting units should be maintained at scheduled intervals to get the very best out of them.

Complete catalog sent on request.



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Order a PARAGON TIMER Today



If you need a Timer . . . order it from Paragon and early shipment will be made . . . provided, of course, you furnish the necessary priority rating. Even though Paragon is manufacturing extensive electrical equipment for the armed forces, it is making and shipping Time Control devices every day.

Timers are being used for more different applications today than ever. Send for a complete catalog today.

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BUILDERS OF ELECTRICAL EQUIPMENT SINCE 1905

Test Insulation the Modern Way with a MODEL B-5 MEGOHMER

NEW BATTERY-VIBRATOR TYPE

No more tiresome cranking of a hand-driven generator . . . Entirely self-contained, steady test potential of 500 volts DC, available at the touch of a switch. Direct reading in insulation resistance.



VARIOUS NEW MODELS
AND RANGES

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WRITE FOR BULLETIN No. 430 E

The Stone You Can Bend and Twist



Flex-Stone

What a job FLEXSTONE does! Cuts like an abrasive stone—but you can bend, twist it. Won't break! Thin, non-brittle. Sharpest abrasives are pressed into flexible core. Easily fits tight places. Smooths hardest contact points in relays, cutouts — cleans small commutators, switches, etc. Non-conductor — no short circuit. Rimac FLEXSTONE speeds electrical service. Send for free sample

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More Gossip

Bush Heads NYC Contractors

At the annual meeting of the New York Electrical Contractors Association, Inc., New York City Chapter No. 1, NECA, A. Lincoln Bush was elected president of the group. Other officers chosen include: John J. Sullivan, vice-president; George F. Price, treasurer; and Louis Freund, secretary.

Appointed to the Executive Committee were Robert E. Denike, Theodore H. Joseph, E. A. Kahn, Walter Knapp, George W. Lankow, M. J. Levy, L. C. MacNutt, Leon Samkoff and J. W. Werther. D. J. Crimmins remains as executive-secretary.

Ely Leaves Electric Association

M. R. (Maury) Ely severed his connections with the Electric Association in Chicago, as of Feb. 1, to take a position in the sales department of the Sylvania Electrical Products Corporation in their Chicago branch.

Maury was connected with the Association since its inception, acting in various capacities. He was the first secretary of the Chicago Electrical Maintenance Engineers, when that group organized in 1926. He held that position until 1930, then again from 1937 until his resignation last month. He was also secretary of the West Suburban Electric League for many years.

R. J. McLaren of the Electric Association will take over the secretariats of these two groups and other duties formerly performed by Mr. Ely.



"ANDY" BROWN, Worcester, Mass., compliments women in industry as he talks shop to Miss Elizabeth Pearson (center) secy-treas., Jacksonville Armature & Motor Works, Jacksonville, Fla., and Mrs. A. Stingley, Four-State Electric Co., St. Joseph, Mo. Miss Lucille Kleinsmith, an officer of Commonwealth Service Sales, Detroit was another shop woman present at the NISA War Conference.

Electrical Contracting, March 1943

Paper Mill Power and Control

[FROM PAGE 29]

the backline shaft and provides a reference voltage for the regulator proportional to machine speed. Any change in speed of the backline shaft therefore causes a proportional change in pilot generator voltage. Any change in pilot generator voltage unbalances the regulator in the proper direction to restore the speed of the backline shaft to normal.

The rewinders, bobbin slitters, gumming machines, printing presses, and embossing machines are driven by individual d.c. adjustable voltage speed variator drives, each consisting of a d.c. motor, MG set, and variable voltage control. There are 46 speed variator drives totalling in excess of 230 hp. which range in rating from 2 hp. to 10 hp. each. All have an operating speed range of eight to one. The speed is readily adjustable throughout this range by means of control knob located convenient to the operator. Fifteen of these drives deliver their power through gear-motors giving output speeds suitable for direct connection.

Twenty-two of these drives depart from the standard in that one control knob starts, adjusts speed, and stops the drives, thus eliminating the customary start-job-stop push buttons, but still maintaining the instantaneous overload and undervoltage protective features. Control features are incorporated in some of the drives to limit the stalled motor torque to a specific value.

In order to keep as much as possible of the speed variator equipment out of the mill proper, all of the motor-generator sets, their starters, and the d.c. control panels are located in a central room. In this room the motor-generator sets are arranged in two long rows separated by steel panels mounting the starters and d.c. control. From this room, the power and control conduits, lead out in a neat series of runs to the d.c. driving motors and the operator's control, on each machine. This leaves only the essential apparatus, consisting of the driving motor and operator's controls, to take up production space around the driven machine.

The electrical layouts were made by the electrical department of J. E. Sirrine & Company, engineers in Greenville, S. C., and all the electrical installations were executed by Huntington & Guerry, electrical contractors in Greenville, S. C.

WHERE TO BUY

Equipment, Materials and Supplies for Electrical Construction — Maintenance — Repairs



**Don't Waste
MANPOWER
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Zenith doubtless has the very Transfer Switch you need—newer, better.

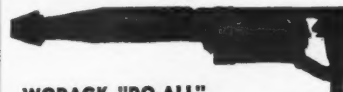
ZENITH Improved Automatic TRANSFER SWITCHES

Normal to emergency service instantaneous. All contacts on one shaft. One-direction operation. Electrically held. Off position not possible. AC to AC—AC to DC—all combinations. 1, 2, 3, 4-pole types. 30 to 400 amps. Get folder, full details. Write.



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DRILLS CONCRETE—METAL—WOOD



WODACK "DO-ALL" ELECTRIC HAMMER AND DRILL

Saves time and money installing expansion anchors. Drills concrete to 1 3/4" dia.; metal to 3/4". Two tools in one. Easy to maintain. Universal motor. Write for folder.

Wodack Electric Tool Corporation
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Telephone AUstin 9866



Make this test: Actual movie photo of test. Note clip's return to perfect form.

LITTELFUSE BERYLLIUM COPPER FUSE CLIPS

LITTELFUSE Beryllium Copper FUSE CLIPS show spring qualities equal to steel. Other characteristics: High fatigue resistance and tensile strength. Grips fuses tighter. Write for Bulletin.

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ELECTRIC MOTOR PARTS FOR ALL MAKES

[One of the largest consolidated
stock of motor, fan and con-
troller parts on the east coast.]

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ON & OFF
REGULARLY

The TORK CLOCK CO., Inc.
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A Good Habit

This Where To Buy Section supplements other advertising in this issue with additional announcements of products and materials of special interest and application in the electrical construction, maintenance and repair. Make a habit of checking this page each issue.



Complete Line OF SODERING FLUXES

We have "the proper flux for every soldering job"

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See last issue for rates.

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ELECTRICAL CONSTRUCTION. Licensed Master Electrician, Estimating, Layout, Material Purchasing, full job supervision. Full knowledge of Federal government specifications. Can secure release. Eight years full charge of small but active Electrical Contracting Company Union card. PW-301, Electrical Contracting, 330 W. 42nd St., New York, N. Y.

★ ★ ★

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MOTOR GEN. SETS

OIL SWITCHES

AIR CIRCUIT BREAKERS

ELECTRIC EQUIPMENT CO.

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★ ★ ★

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HIGH GRADE ELECTRICAL MAN

Must be thoroughly familiar with all types of electric motors, starters, controls, etc. Need not be graduate engineer, but must have proven sales and executive ability. Please give complete details in first letter.

Permanent position at substantial salary to right man. Please do not answer unless you meet fully the requirements outlined.

P-300, Electrical Contracting
520 North Michigan Ave.,
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This Sherman Lug Is Made to Handle the Heavy Loads



Here is a heavy duty wrought copper lug with the strength, weight and construction to do the hard jobs — handle big loads. Precision made, free from defects, with FLAT contact surfaces. For transformers, circuit breakers and other heavy duty electrical equipment.

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Specify Sherman

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- Ground Clamps
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- Fixture Connectors

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FOR HEAVY
INDUSTRIAL SERVICE



One of the many various types of RUSGREEN Endulators. Also End Belts for use with steel or fibre conduit. D.C. service or non-ferrous metal.

RUSGREEN Bus Supports . . . made for indoor or outdoor service. All types and constructions.



For more than a quarter of a century, RUSGREEN has specialized in the manufacture of Standard and special electrical items for heavy industrial applications. All are built to the most exacting requirements . . . assurance that they'll do the job. Write for a complete selection of RUSGREEN bulletins.

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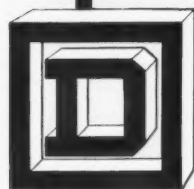
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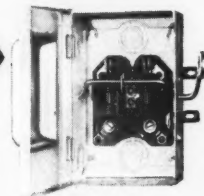
a Complete Line of safety switches



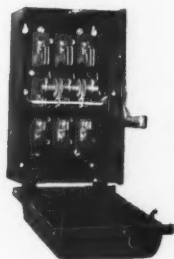
Weatherproof, dust-tight and explosion-resisting enclosures are available with ratings up to 200 amperes. Dust-tight switches approved for Class II, Group G hazardous locations. Explosion-resisting enclosures approved for Class I, Group D hazardous location.



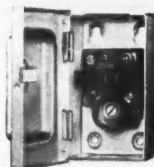
General Purpose Switches (Type D) are quick break only in capacities from 60 to 600 amperes inclusive. Thirty-ampere (and rain-tight) switches are not quick break. Made with 2, 3 and 4 pole and 2, 3, 4 and 5-wire s/n systems. 230 volt A.C. and 250 volt D.C.



Type A Switches with visible blades. Quick make, quick break and interlocked cover; rated from 30 to 2400 amperes, up to 600 volts. Horsepower rated. Fusible and not fusible. 2, 3 and 4 poles and 3, 4 and 5-wire, solid neutral.



Blue Label Line—Type D Switches are compact, employing a rotary type of blade construction. Made for 2 pole and 2-wire and 3-wire, 230 volt A.C.-250 volt D.C. systems. Available for 30 to 60 ampere fuses. Front operated.

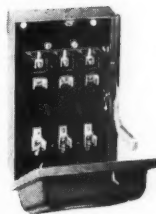


CALL IN A SQUARE D FIELD ENGINEER

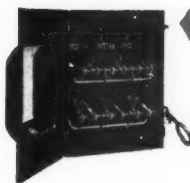
If you have a problem which involves electrical control or distribution, you're welcome to the counsel of the nearest Square D Field Engineer. He is in constant contact with plants of every kind and size. He studies methods and applications with the idea of simplifying new jobs or doing old ones better.

There are Field Engineers in Square D branch offices in 52 principal United States and Canadian cities. Their services are dedicated to solving industry's war and postwar electrical problems.

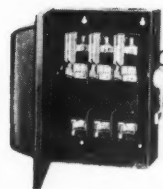
Type A Switches with concealed blades. Quick make, quick break and interlocked cover. Design permits smaller boxes with plenty of wiring space. Up to 200 amperes, 600 volts. H.P. rated. Made in 2 and 3 pole, 3 and 4-wire solid neutral.



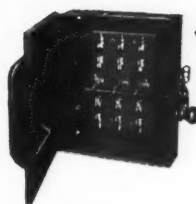
Manual Motor Starters are available up to 60 amperes, 575 volts A.C. horsepower rated. Auxiliary blades shunt running fuses when operating handle is moved to starting position. Releasing handle automatically moves blades to running position with fuses in circuit.



Type C Industrial Safety Switches are quick make and quick break. Made up to and including 600 amperes, 600 volt. Fusible and not fusible. Horsepower rated. 2, 3 and 4 poles, and 3, 4 and 5-wire solid neutral. Also available in rain-tight enclosures.



Double Throw Switches. Made in sheet steel or explosion-resisting enclosures, approved for Class I, Group D hazardous locations. Interlocked covers and quick make and quick break mechanism in sheet steel enclosures.



SQUARE D's unusually complete line of safety switches covers five divisions: 1. Heavy Duty Industrial Type A. 2. Intermediate Industrial Duty Type C. 3. General Purpose (Type D). 4. Double Throw Switches. 5. Manual Motor Starters.

The predominance of Square D switches throughout industry speaks volumes for their performance.

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DETROIT - MILWAUKEE - LOS ANGELES

KOLLMAN INSTRUMENT DIVISION, ELMHURST, NEW YORK

IN CANADA: SQUARE D COMPANY, LIMITED, TORONTO, ONTARIO



G. H. Ryan, salesman, Hendrie & Bolt-hoff Manufacturing and Supply Co., Dead-wood, S. Dak., G-E distributor, feels confident of giving customers good service regardless of gas rationing by using his horse, Dakota Ranger, to supply transportation, if necessary.

★ ★ ★



E. G. Lund (center), lighting specialist, General Electric Supply Corporation, Buffalo, N. Y. and F. J. Button (left), and Elmer Harvey, G-E Supply Corp. salesman, are choosing lighting and wiring materials to recommend for installation in new local war project.

★ ★ ★

L. G. Gloor (center), manager, Crescent Electric Supply Company, Burlington, Iowa, G-E distributor, is discussing wiring materials suitable for war jobs being handled by customers with Crescent salesmen, T. W. Kelley (left), and P. F. Rohner.



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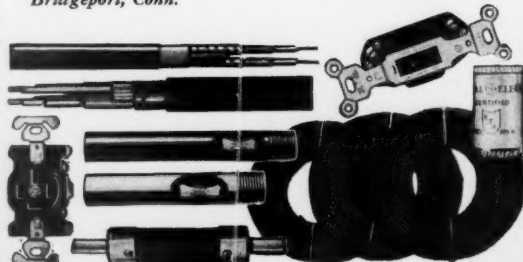
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